

15
BSM

REPUBLIC OF SOUTH AFRICA
REPUBLIEK VAN SUID-AFRIKA

CAB INTERNATIONAL
MYCOLOGICAL INSTITUTE
LIBRARY

15 SEP 1993

**AGRICULTURAL RESEARCH
LANDBOONAVORSING
1991**

CAB INTERNATIONAL



00076704



Digitized by the Internet Archive
in 2025



REPUBLIC OF SOUTH AFRICA
REPUBLIEK VAN SUID-AFRIKA

AGRICULTURAL RESEARCH LANDBOONAVORSING 1991

AGRICULTURAL RESEARCH

LANDBOONAVORSING

Eastern Cape Region

Private Bag 815, East London 6050

Free State Region, Free College of Agriculture

Private Bag 801, Oos 9300

Highveld Region

Private Bag X804, Pretoria 0001

Karoo Region, Graduate College of Agriculture

Private Bag X319, Mafikeng 9800

West Region

Private Bag X3009, Potchefstroom 2000

Midlands

Private Bag 804, Bloemfontein 9301

North-West, Landboueskool Oos-Nord

Private Bag X300, Mafikeng 9800

North-West

Private Bag X3009, Potchefstroom 2000

South-West

Private Bag X315, Windhoek 9000



DEPARTMENT OF AGRICULTURAL DEVELOPMENT
DEPARTEMENT VAN LANDBOU-ONTWIKKELING

Type-set and published by the Department of Agricultural Development
and obtainable from the Director of Agricultural Information,
Private Bag X144, Pretoria 0001

Geset en uitgegee deur die Departement van Landbou-ontwikkeling en
verkrygbaar van die Direkteur, Landbou-inligting, Privaatsak X144,
Pretoria 0001

Printed in the Republic of South Africa by the Government Printer,
Pretoria

Gedruk in die Republiek van Suid-Afrika deur die Staatsdrukker, Pretoria

1992

ISBN 0-621-14518-1

AGRICULTURAL RESEARCH
LANDBOUONAVORSING
1992



DEPARTMENT OF AGRICULTURAL DEVELOPMENT
REPUBLIC OF SOUTH AFRICA

ADDRESSES OF INSTITUTES, REGIONS AND DIRECTORATES

RESEARCH INSTITUTES

Animal and Dairy Science Research Institute,
Private Bag X2, Irene 1675

Citrus and Subtropical Fruit Research Institute,
Private Bag X11208, Nelspruit 1200

Fruit and Fruit Technology Research Institute,
Private Bag X5013, Stellenbosch 7600

Grain Crops Research Institute,
Private Bag X1251, Potchefstroom 2520

Grassland Research Centre
Private Bag X05, Lynn East 0039

Plant Biotechnology Research Centre,
Private Bag X293, Pretoria 0001

Plant Protection Research Institute,
Private Bag X134, Pretoria 0001

Soil and Irrigation Research Institute,
Private Bag X79, Pretoria 0001

Tobacco and Cotton Research Institute,
Kroondal, Private Bag X82075, Rustenburg 0300

Vegetable and Ornamental Plants Research
Institute, Private Bag X293,
Pretoria 0001

Veterinary Research Institute,
P.O. Onderstepoort 0110

Viticultural and Oenological Research Institute,
Private Bag X5026, Stellenbosch 7600

AGRICULTURAL REGIONS

Eastern Cape Region,
Private Bag X15, Stutterheim 4930

Free State Region, Glen College of Agriculture,
Private Bag X01, Glen 9360

Highveld Region,
Private Bag X804, Potchefstroom 2520

Karoo Region, Grootfontein College of Agriculture,
Private Bag X529, Middelburg 5900

Natal Region,
Private Bag X9059, Pietermaritzburg 3200

ADRESSE VAN INSTITUTE, STREKE EN DIREKTORATE

NAVORSINGSINSTITUTE

Navorsingsinstituut vir Graangewasse,
Privaatsak X1251, Potchefstroom 2520

Navorsingsinstituut vir Groente en Sierplante,
Privaatsak X293, Pretoria 0001

Navorsingsinstituut vir Grond en Besproeiing,
Privaatsak X79, Pretoria 0001

Navorsingsentrum vir Plantbiotegnologie,
Privaatsak X293, Pretoria 0001

Navorsingsinstituut vir Plantbeskerming,
Privaatsak X134, Pretoria 0001

Navorsingsinstituut vir Sitrus en Subtropiese
Vrugte, Privaatsak X11208, Nelspruit 1200

Navorsingsinstituut vir Tabak en Katoen,
Kroondal, Privaatsak X82075, Rustenburg 0300

Navorsingsinstituut vir Veeartsenykunde,
Pk. Onderstepoort 0110

Navorsingsinstituut vir Vee- en Suiwelkunde,
Privaatsak X2, Irene 1675

Navorsingsinstituut vir Vrugte en Vrughtetegnologie,
Privaatsak X5013, Stellenbosch 7600

Navorsingsentrum vir Weiding,
Privaatsak X05, Lynn East 0039

Navorsingsinstituut vir Wingerdbou en Wynkunde,
Privaatsak X5026, Stellenbosch 7600

LANDBOUSTREKE

Hoëveldstreek,
Privaatsak X804, Potchefstroom 2520

Karoostreek, Landboukollege Grootfontein
Privaatsak X529 Middelburg 5900

Natalstreek,
Privaatsak X9059, Pietermaritzburg 3200

Oos-Kaapstreek,
Privaatsak X15, Stutterheim 4930

Transvaalstreek,
Privaatsak X180, Pretoria 0001

Transvaal Region,
Private Bag X180, Pretoria 0001

Winter Rainfall Region,
Private Bag, Elsenburg 7607

Vrystaatstreek, Landboukollege Glen,
Privaatsak X01, Glen 9360

Winterreënstreek,
Privaatsak, Elsenburg 7607

DIRECTORATES

- Directorate of Agricultural Information
Private Bag X144, Pretoria 0001
- Directorate of Agricultural Economics
Private Bag X416, Pretoria 0001
- Directorate of Agricultural Mechanisation,
Private Bag X515, Silverton 0127
- Directorate of Biometric and Datametric Services,
Private Bag X640, Pretoria 0001
- Directorate of Agricultural Technical
Administration, Private Bag X116, Pretoria 0001
- Directorate of Financial Assistance
Private Bag X118, Pretoria 0001
- Directorate of Irrigation Engineering,
Private Bag X515, Silverton 0127
- Directorate of Soil Conservation and Drilling
Services, Private Bag X515, Silverton 0127

DIREKTORATE

- Direktoraat Besproeiingsingenieurswese,
Privaatsak X515, Silverton 0127
- Direktoraat Biometriese en Datametrisiese Dienste,
Privaatsak X640, Pretoria 0001
- Direktoraat Finansiële Bystand,
Privaatsak X118, Pretoria 0001
- Direktoraat Grondbewaring- en Boordienste,
Privaatsak X515, Silverton 0127
- Direktoraat Landbou-inligting,
Privaatsak X144, Pretoria 0001
- Direktoraat Landbou-ekonomie,
Privaatsak X416, Pretoria 0001
- Direktoraat Landboumeganisasie,
Privaatsak X515, Silverton 0127
- Direktoraat Landbou-tegniese Administrasie,
Privaatsak X116, Pretoria 0001

KEY TO PROJECT SERIES/SLEUTEL TOT PROJEKTEREES

DIRECTORATES/DIREKTORATE

Biometric and Datametric Services	BM	Biometriese en Datametrisiese Dienste
Agricultural Engineering	LI	Landbou-ingenieurswese
Agricultural Production Economics	PE	Landbouproduksie-ekonomie

RESEARCH INSTITUTES/NAVORSINGSINSTITUTE

Soil and Irrigation	GB	Grond en Besproeiing
Grain Crops	GG	Graangewasse
Vegetable and Ornamental Plants	GS	Groente en Sierplante
Grassland Research	NW	Weidingsnavorsing
Veterinary Science (Onderstepoort)	OP	Vecartsenykunde (Onderstepoort)
Plant Protection	PB	Plantbeskerming
Botany	PL	Plantkunde
Citrus and Subtropical Fruit	SS	Sitrus en Subtropiese Vrugte
Tobacco and Cotton	TK	Tabak en Katoen
Animal and Dairy Science	VS	Vee- en Suiwelkunde
Fruit and Fruit Technology	VV	Vrugte en Vrugtetegnologie
Viticulture and Oenology	WW	Wingerdbou en Wynkunde

Eastern Cape (Dohne)	D	Oos-Kaap (Dohne)
Highveld	H	Hoëveld
Karoo	K	Karoo
Natal	N	Natal
Transvaal	T	Transvaal
Free State	V	Vrystaat
Winter Rainfall	W	Winterreën

CONTENTS OF THIS BOOK		SAMMINGSAMEN VAN DIESE WERK	
Index of names & places	71	Index van name & plekke	71
Index of subjects	75	Opsomming van onderwerpe	75
Index of names	76	Opsomming van name	76

CONTENTS

INHOUD

FINAL REPORTS ON RESEARCH

PROJECTS	1
Contents	3
Reports (summarised)	5
SCIENTIFIC ARTICLES	
PUBLISHED	55
REGISTERED PROJECTS	97
Contents	99
Projects	105

FINALE VERSLAE OOR NAVORSINGS-

PROEKTEN	1
Inhoud	3
Verslae (opsommend)	5
GEPUBLISEERDE WETENSKAPLIKE	
ARTIKELS	55
GEREGISTREERDE PROEKTEN	97
Inhoud	99
Projekte	105

COMPILATION OF THIS ISSUE

Final reports on research projects	77
Scientific articles published	571
Registered projects	2 966

SAMESTELLING VAN HIERDIE UITGAWE

Finale verslae oor navorsingsprojekte	77
Gepubliseerde wetenskaplike artikels	571
Geregistreerde projekte	2 966

Note: The Department issues a separate list of research workers and lecturing staff, which is obtainable on request from the Directorate of Agricultural Information, Private Bag X144, Pretoria 0001. Information in this edition covers the era 1990.04.01 – 1991.03.31.

Let wel: Die Departement reik 'n aparte lys uit van navorsers en doserende personeel, wat op aanvraag verkrygbaar is van die Direktoraat Landbou-inligting, Privaatsak X144, Pretoria 0001. Inligting in hierdie uitgawe dek die tydperk 1990.04.01 – 1991.03.31.

FINAL REPORTS ON RESEARCH PROJECTS

FINALE VERSLAË OOR NAVORSINGSPROJEKTE

CONTENTS

PLANT PRODUCTION PROMOTION	5
Agronomy research	5
<i>Small grain</i>	5
WHEAT	5
TRITICALE	9
DURUM	9
BARLEY	10
RYE	11
OATS	11
<i>Protein and oil seeds</i>	11
GROUNDNUTS	11
SOYBEANS	14
<i>Other agronomy crops</i>	15
COTTON	15
TOBACCO	16
Horticulture research	16
<i>Tuber crops</i>	16
POTATOES	16
<i>Vegetables</i>	17
TOMATOES	17
ONIONS	18
COLE CROPS	19
VINES CROPS	19
SUNDRY VEGETABLES	20
CHICORY	20
<i>Flowers and ornamental plants</i>	21
PROTEAS	21
CUT FLOWERS	21
<i>Pome and stone fruits</i>	23
APPLES	23
PEARS	23
PEACHES	24
<i>Viticulture</i>	25
WINE GRAPES	25
<i>Citrus and subtropical crops</i>	25
OTHER SUBTROPICAL CROPS	25
Plant protection research	25
<i>Entomology/Zoology</i>	25
INSECTS	25
<i>Plant pathology/Microbiology</i>	26
FUNGI	26
BACTERIA	28
VIRUSES	29
<i>Weed research</i>	30
WEEDS	30

ANIMAL PRODUCTION PROMOTION	33
Animal production and animal products research.....	33
<i>Animal production</i>	<i>33</i>
PIGS.....	33
<i>Animal products</i>	<i>34</i>
MEAT	34
<i>Supporting animal research</i>	<i>35</i>
ANIMALS	35
AGRICULTURAL RESOURCE UTILISATION	36
Resource research	36
<i>Primary resources.....</i>	<i>36</i>
SOIL.....	36
<i>Surveys and demarcation</i>	<i>36</i>
LAND USE.....	36
Resource utilisation research (crops)	37
<i>Field crops</i>	<i>37</i>
SMALL GRAIN	37
OIL AND PROTEIN SEEDS	37
<i>Garden crops</i>	<i>38</i>
VEGETABLES	38
Resource utilisation research (animals)	38
<i>Ruminants.....</i>	<i>38</i>
LARGE STOCK	38
Resource utilisation (pasture).....	40
<i>Pasture</i>	<i>40</i>
VELD	40
CULTIVATED PASTURE.....	42
LUCERNE.....	44
ANNUAL FODDER CROPS	44
Agricultural production economy research	45
<i>Macro resource economy</i>	<i>45</i>
STRUCTURAL STUDIES	45
ENTREPRENEUR DEVELOPMENT	47
Extension science investigations.....	47
<i>Resources and technology</i>	<i>47</i>
MAN	47
Programmed extension	48
<i>Resource utilisation</i>	<i>48</i>
STOCK AND GAME FARMING.....	48
FRUIT FARMING.....	53

REPORTS (SUMMARISED)

PLANT PRODUCTION PROMOTION

AGRONOMY RESEARCH

Small grain

WHEAT

- *Physiology*

GG.2121/03/1/4: DETERMINATION OF PHOTOSYNTHETIC RATE OF WHEAT CULTIVARS. 1983-1988
H.A. Smit

The correlation of yield potential and gas exchange rate of wheat cultivars was investigated in a glasshouse study.

The gas exchange rate and plant components of five cultivars were studied at five growth stages. Total grain yield plant⁻¹ could not be explained by means of CO₂ exchange rate. The same trend was found in previous seasons.

- *Upgrading*

GG.2121/07/2/3: THE GENETIC CONTROL OF PHOTOPERIOD/TEMPERATURE SENSITIVITY. 1978-1984
P.B. la Grange

Although this research was terminated prematurely some information was obtained. The results of this study indicate that with regard to days to flowering, mainstem spikelet number, plant kernel mass (yield) and total plant dry mass, advances can be made by selection of extremes with the biggest chance of success for days to flowering.

Other characteristics have the problem that large coefficients of variation can cause the environmental factors to mask the genetic contribution. The characteristics with low broad-based heritabilities like main tiller days to flowering, mainstem leaf number and plant tiller number would show very slow response to selection.

This study also indicated that apart from flowering date, selection for all other characteristics on a single plant basis will have a limited response to selection.

GG.2121/07/3/2: USING PHYSICAL AND CHEMICAL MUTAGENS TO CREATE NEW VARIABILITY IN WHEAT BREEDING PROGRAMMES. 1976-1990
H.A. van Niekerk

One of the major objectives of this investigation was to gain a better insight and understanding of the new and exciting chromosome banding techniques that revealed much additional information on chromosome structure and function, and have been so successful in the identification of human and animal chromosomes and the genes they contain. Secondly, this study attempted to develop similar techniques for wheat chromosomes that will be equally effective in chromosome identification and cytogenetic research.

Following the first C banding reports on the wheat cultivar 'Chinese Spring' in 1974, the present investigation enabled the successful identification of all 21 chromosomes of this cultivar and to elucidate some of the discrepancies in the earlier papers. The relevant results published in 1983 used the system of chromosome banding nomenclature commonly used for human chromosomes. This usage has, with minor modifications, been adopted by the recent 7th International Wheat Genetics Symposium held in Cambridge in July 1988. The accuracy of the present C banding karyotype will have to be updated once a standard pure line of 'Chinese Spring' has been internationally accepted. This is important to avoid further discrepancies, owing to different lines of 'Chinese Spring' showing minor differences in chromosome banding.

To increase the number of cells at mitotic metaphase for chromosome banding studies, a 5-amino-uracil pre-treatment was developed. This produced a two- to fourfold increase in the number of metaphase plates without affecting the chromosome banding patterns.

During the course of this study some variations of the steps of the basic C banding technique have also been investigated. It has been pointed out by other researchers that some steps of the technique are more important than others. Especially the molarity of the phosphate buffer used during Leishman staining, appeared to have a major influence on the bands of wheat chromosomes. Therefore, the role of a "high" and "low" molarity of the phosphate buffer in the stain was investigated. After quantitative evaluation of the banding patterns it was concluded that the terminology of N banding, the only other kind of banding that has been applied successfully to wheat chromosomes, should perhaps be reconsidered.

Extensive data were gathered on the two morphological features, length and centromeric index, of the somatic metaphase chromosomes of 'Chinese Spring' identified by means of C banding. This application was not previously possible because individual somatic metaphase chromosomes could not be distinguished on morphological features alone. Using the data based on overall length it was established that for 'Chinese Spring' there was no proof of differential chromosome spiralisations.

However, between-cell differences in position of the centromere were due to differential spiralisations within the chromosomes. Combining these two morphological features, most chromosomes could be distinguished from one another. Applying the same analysis to another wheat cultivar, 'Skemer', no differential spiralisations were detected regarding total chromosome length or position of the centromere.

C banded chromosomes of the two wheat cultivars 'Skemer' and 'Chinese Spring' were critically evaluated for C banding differences. Fourteen major differences were identified which could be used as very effective cytological markers in ongoing cytogenetic research.

Photometrically determined profiles of thirteen C-banded wheat chromosomes and subsequent statistical analysis was investigated. A number of problems were pointed out by this study, but there were also significant results to indicate the applicability of statistical analysis to C-banded wheat chromosomes - not so much to all the chromosomes in a cell but to selected well-banded chromosomes or parts of chromosomes.

It was proved that a microdensity meter could replace manual measurement of chromosomes to obtain more objectively determined quantitative data, as opposed to subjective evaluation of C-band intensity.

C bands have been used to identify eighteen of the possible twenty-one monosomics of a well-adapted South African wheat cultivar 'Flameks', that has excellent quality characteristics. Univalent shift was detected in the case of five chromosomes. The availability of this monosomic series together with a similar series in the locally adapted wheat cultivar 'Inia 66' is very significant for local wheat breeding programmes. This is especially true in gaining insight into the genetics of the quality characteristics of these cultivars by means of reciprocal chromosome substitutions.

GG.2121/07/4/3:

THE DEVELOPMENT OF A COMPUTERISED DATABASE FOR WHEAT GERM PLASM.
1983-1984

M.T. Aartsma

A small grain germ plasm collection was initiated by Dr R.A. Kilpatrick at the Small Grain Centre during 1981. It soon became apparent that a computerised database would have to be developed. The task of developing the various programmes was assigned to Dr Frances Thatcher.

It was decided that the database would be run on the Burroughs computer - the only available computer facilities at the Small Grain Centre at that time.

During 1984 a new personal computer, as well as a very applicable database programme, D-Base III was purchased. This hard- and software solved all the problems with regard to computerisation. Since then this programme has been used very effectively for storage and retrieval of the relevant data.

This programme has now been updated by purchasing D-Base IV. The database of the germ plasm bank is now routinely done with the D-Base programme and no further research in this regard is necessary.

• Pathology

GG.2121/19/4/1:

THE OCCURRENCE AND EFFECT OF BROMUS MOSAIC VIRUS (BMV) ON WHEAT IN
THE SUMMER RAINFALL AREA. 1988-1989

C.P.R. Cronje

The eastern OFS strain of BMV is a distinct strain or biotype, and occurs in such high concentrations in some infected plants that any other viruses are either not detectable in the presence of this virus, or the frequency of simultaneous occurrence is so low (i.e., CMV) that the other virus could not be regarded as economically important.

Although seed transmission of BMV was reported by other researchers (Von Wechmar *et al.*, 1984) to be of major importance in the epidemiology of the virus, no evidence could be found to support this statement. Not only is the virus eliminated to a large extent by a loss in viability of infected seed, but also only very high percentages of seed infection (>20 %) caused an economically important yield loss, because of the ability of winter cultivars to tiller more profusely under conditions of lower plant density owing to non-viable seed.

Von Wechmar reported (1981) that tests on commercial seed sources indicated the presence of BMV. Repetitions of such tests done during the course of this study also indicated the presence of this virus, but the percentages of infections were seldom higher than 5 %. In the light of the results obtained during this study such low percentages would have no effect on the yield of plants germinated from the seed.

Brome mosaic virus infection had a detrimental effect on the development of wheat under both greenhouse and field conditions, and yield was mainly affected by the growth stage of the plant during BMV infection.

With very high inoculum concentrations of BMV (0,1 mg/ml) used to infect field grown wheat during stem elongation (the most susceptible stage in the life cycle), the highest yield losses obtained were never in excess of 20 %. The inoculum concentrations of seed and aphid-transmitted BMV are very low (approximately 0,001 mg/ml), and infection does not necessarily occur during the stem elongation phase in the life cycle. It was, therefore, concluded that under normal circumstances the yield loss attributable to BMV infection is very low.

Although the virus forms part of a wheat disease/major pest complex, (Rybicki, 1984), the effect of the virus was negligible when compared to the phytotoxic effect of *D. noxia*. This aphid alone can cause yield losses up to 50 %. The present chemical control strategy for *D. noxia* (Du Toit, 1986) is based on aphid control before GS.31 (stem elongation) in the case of severe early infestations. It was found that under greenhouse conditions *D. noxia*-transmitted BMV attained slightly higher virus titres than mechanically transmitted infections. Effective aphid control under field conditions following the recommended procedures, would, therefore, also indirectly control the inoculum concentration of virus.

D. noxia is not a very effective vector of BMV. Only 30 % successful transmissions of BMV with field-collected *D. noxia* occurred under controlled conditions and this level dropped even further with subsequent transfers using the same colony of aphids.

Among the natural grasses occurring in the eastern OFS, only *Bromus* spp. has been reported as a natural host for both BMV and *D. noxia*. Although *Eragrostis* spp. and *Chenopodium* spp. also act as alternate hosts for BMV, evidence of random *D. noxia* probing on these plants was not found.

Stem and leaf rust are presently under good genetic control owing to the planting of resistant cultivars and this route of possible BMV transmission is considered to be of minor importance. Although many possible BMV transmission routes to newly sown wheat crops exist, i.e. seed, *D. noxia* and rusts, none of these routes were found to be effective.

This fact would explain the low percentages of field infections of a BMV inoculum concentrations high enough to cause yield losses. Although heavy latent infections are sometimes found with the sensitive ELISA, the mere presence of BMV at low concentrations does not imply that there will be any effect on yield. This only occurs if BMV concentrations cross the 0,4 g BMV/kg plant tissue threshold. This seldom happens with even severe infections with both BMV and *D. noxia*.

Taking these facts into consideration it would be unfounded to consider BMV as a major wheat disease. The potential for an epidemic outbreak is small and even in the event of such an outbreak, the ability of BMV to cause large crop losses is limited.

• Pests

GG.2121/20/1/2:

ECOLOGICAL STUDIES ON THE RUSSIAN WHEAT APHID, *DIURAPHIS NOXIA*, IN THE EASTERN FREE STATE. 1983-1987

Y.K. Aalbersberg

In the eastern Orange Free State the Russian wheat aphid *Diuraphis noxia* (Mordvilko) oversummers on *Bromus* spp. and volunteer wheat. The presence of *D. noxia* on these alternate hosts, which occur in and around wheat fields, ensures the infestation of commercially planted wheat during the winter months.

The infestation build-up in commercially planted wheat in 1983-1985 was logarithmic. The period of exponential increase occurred between growth stage (G.S.) 30-45. In all three years and on both Betta and Flamink cultivars, 100 % infestation levels were recorded. The spatial distribution of *D. noxia* was monitored in a field in which a maximum infestation of 73 % was reached. The distribution was initially random but for the rest of the season it was contagious.

From G.S. 30 onwards the aphid populations increased rapidly and then declined quickly from G.S. 60 onwards. The mean number of *D. noxia* recorded at peak population levels tended to be 150-160 per tiller. The increase in aphids x plants infested was significantly correlated with time, growth stage and accumulated day degrees. Throughout the growth of the plants the aphids tended to move upwards, infesting the youngest

growth. Most of the *D. noxia* concentrated on the proximal 9 cm of the adaxial leaf surface. Furthermore, during anthesis and senescence, the aphids concentrated on the flag leaf, its sheath and the ear.

Large reductions in yield were recorded in all plants which became infested. Single plant data showed that reductions, depending on the duration of infestation, in seed mass ranged from 25-80 % and in 1 000 kernel mass from 15-45 %. Losses in yield were correlated with both the duration of infestation and cumulative aphid-days.

Laboratory studies showed that the development rate of *D. noxia* was correlated with temperature. The duration of the nymphal stadia, the mean pre-imaginal development period, the reproductive period, post-reproductive period, number of nymphs produced and total life-span were ascertained for *D. noxia* kept at three sets of temperature and daylength conditions. The threshold temperature for development ($t = 0,54$, $SE = 0,70$) and the number of day degrees above t required by *D. noxia* to complete development ($K = 158,73$, $SE = 7,56$) were obtained from the linear relationship between development rate and temperature. A third degree polynomial gave the best fit for the relationship between development rate and temperature.

The diagnostic features of *D. noxia* instars were studied and an instar key, based largely on the proportionate lengths of the antennal segments, was constructed.

The occurrence and population build-up of natural enemies in *D. noxia* infested fields were monitored using both Moericke and pitfall traps. The coccinellid *Hippodamia variegata* (Goeze) and the two aphidiids *Aphidius colemani* Viereck and *Diaeretiella rapae* (McIntosh) were the most numerous. However, natural enemy populations only reached their maxima after *D. noxia* infestations had attained their maxima. The time-specific life-tables showed that the natural enemies had their greatest impact during the decline phase of *D. noxia* populations. It furthermore appeared that predators had more impact than parasitoids.

The presence of Japanese radish around a wheat field did enhance natural enemy numbers. However, *D. noxia* populations attained high levels and as a result the reductions in yield were as much or more than were recorded in a similar field without a border crop.

During November, mass emigration of alate *D. noxia* from senescing wheat occurred. Flight peaks could not be correlated with a specific time of the day, but emigration early in the morning was limited by low light intensities. Furthermore, of all the factors monitored, emigration was inhibited most by low temperatures, followed by low saturation deficits and finally by high wind speeds.

GG.2121/20/1/3:

SEED TREATMENT WITH SYSTEMIC INSECTICIDES AS A METHOD FOR THE CONTROL OF THE RUSSIAN WHEAT APHID, *DIURAPHIS NOXIA*. 1980-1989

P.A. Butts

Different dosage rates of 11 systemic insecticides were tested in the green house as seed treatments for the control of *Diuraphis noxia*. Seven of the insecticides tested, had a phytotoxic effect on seed germination. A further three insecticides caused decreases in seedling emergence.

An unregistered insecticide, code name C G A 73102 (40 % w.p.) had no effect on germination and seedling emergence and gave 62,71 % control of *D. noxia* at a dosage rate of 8 g a.i./kg of seed under green house conditions.

In subsequent field trials C G A 73102 were tested at 8 g a.i./kg seed for control of *D. noxia*. No effective control was obtained and infestations on treated plots reached high levels.

From these results it is apparent that all insecticides tested, with the exception of one, are phytotoxic to germinating wheat. The most promising insecticide gave inferior control under field conditions owing to a too short residual action. Seed treatment as a method for controlling *D. noxia* is, therefore, not practical or effective.

GG.2121/20/1/4:

SOIL TREATMENT WITH SYSTEMIC INSECTICIDES AS A METHOD FOR THE CONTROL OF THE RUSSIAN WHEAT APHID, *DIURAPHIS NOXIA*. 1980-1987

F. du Toit

The effect of soil applications of disulfoton (trade name: *Solvirex*) at time of planting on infestations by *Diuraphis noxia* and on wheat yield were studied in the period 1982 to 1984. The efficacy of a soil treatment, at time of planting was compared to corrective spraying at various growth stages and to combinations of soil treatment and corrective spraying in field trials at the Small Grain Centre.

Soil treatment with disulfoton led to a retardation in both the time of initial infestation and in the rate of population increase. The wheat yields of soil treated plots were significantly higher compared to corrective spraying only in one out of three years. In one year soil treatment followed by a corrective spray later in the season resulted in significantly higher yields than either a soil treatment only or one corrective spray.

It is concluded that the efficacy of a soil treatment would vary from season to season depending on the infestation pressure which will vary from year to year. At the time of planting of wheat, the infestation levels of *D. noxia*, which could be experienced later in the season, is an unknown factor and the application of expensive soil systemic insecticides at time of planting is, therefore, a financial risk. Corrective spraying are probably more economical than preventative soil treatment in the long run.

- *Crop science*

GG.2121/30/4/2:

THE INFLUENCE OF STUBBLE MULCHES ON GRAIN YIELD OF WHEAT IN THE
SUMMER RAINFALL AREA. 1982-1990

H.A. Smit

The influence of stubble mulch intensities on yield components of wheat grown in the summer rainfall area was investigated during seasons of 1984 to 1988.

At the end of each growing period, the remaining wheat straw was burnt and the plots cultivated with a tine implement whereas the control plots were ploughed. Subsequently wheat straw was applied at rates of 0 (control), 1, 2, 3, 4 and 5 t ha⁻¹.

These results showed no significant differences with regard to total yield, per cent protein, plants m⁻², ears per plant, ears m⁻² or production of straw per ha. Neither were significant differences obtained during individual seasons. These negative results could be ascribed to the relative inefficiency of flat residue compared to that of standing residue. A further contributing factor was the favourable soil water conditions during two seasons.

GG.2121/30/6/1:

THE APPLICATION OF HERBICIDES ON DIFFERENT STATES OF WILD OATS IN
WHEAT IN THE WINTER RAINFALL AREA. 1982-1990

H.A. Smit

Hoelon (didofop-methyl 284 g a.i. l⁻¹) was applied at 1,5 l ha⁻¹ at the 2, 4, 6, 8 leaf, pipe and booting stages of *Avena fatua*. Wild oat control, hectoliter mass and grain yield of the wheat crop were determined.

The results indicated that the best wild oat control was obtained with Hoelon applications at the 2- and 4-leaf stages. The efficacy decreased significantly with applications at the pipe and booting stages.

Hectoliter mass was not affected, whereas the grain yield of the wheat crop decreased significantly in only one season with Hoelon applied at the pipe and booting stages.

TRITICALE

- *Upgrading*

GG.2122/07/3/3:

THE DEVELOPMENT OF A COMPUTERISED DATABASE FOR UNIQUE TRITICALE
GERM PLASM. 1983-1984

M.T. Aartsma

A small grain germ plasm collection was initiated by Dr R.A. Kilpatrick at the Small Grain Centre during 1981. It soon became apparent that a computerised database would have to be developed. The task of developing the various programmes was assigned to Dr Frances Thatcher.

It was decided that the database would be run on the Burroughs computer - the only available computer facilities at the Small Grain Centre at that time. During 1984 a new personal computer as well as a very applicable database programme, D-Base III was purchased. This hard- and software solved all the problems with regard to computerisation. Since then this programme has been used very effectively for storage and retrieval of the relevant data.

This programme has now been updated by purchasing D-Base IV. The database of the germ plasm bank is now routinely done with the D-Base programme and no further research in this regard is necessary.

DURUM

- *Upgrading*

GG.2123/07/2/3:

THE DEVELOPMENT OF A COMPUTERISED DATABASE FOR DURUM GERM PLASM.
1983-1984

M.T. Aartsma

A small grain germ plasm collection was initiated by Dr R.A. Kilpatrick at the Small Grain Centre during 1981. It soon became apparent that a computerised database would have to be developed. The task of developing the various programmes was assigned to Dr Frances Thatcher.

It was decided that the database would be run on the Burroughs computer - the only available computer facilities at the Small Grain Centre at that time. During 1984 a new personal computer as well as a very applicable database programme, D-Base III was purchased. This hard- and software solved all the problems with regard to computerisation. Since then this programme has been used very effectively for storage and retrieval of the relevant data.

This programme has now been updated by purchasing D-Base IV. The database of the germ plasm bank is now routinely done with the D-Base programme and no further research in this regard is necessary.

BARLEY

• *Physiology*

GG.2124/03/1/1:

DETERMINATION OF FACTORS WHICH CAUSE BLACK END COLOURATION TO BARLEY IN THE WINTER RAINFALL AREA. 1982-1988

E.G.J. Brand

The object of the study was to determine the effect of environmental factors, cultivar characteristics and harvest methods on black discolouring of barley seed. Three cultivars were planted under irrigation and dryland conditions. Three harvesting methods were used namely; straight and windrowed at two moisture contents of the seed, namely 20 and 30 %. All the treatments were threshed at 11 % moisture content of the grain.

The results of this study indicate that although black discolouring of the seed was present in the control plots, irrigation and windrowing aggravated the problem. No differences between cultivars were found. The irrigated treatment windrowed at 20 % moisture of the grain promoted the black discolouring of the seed. It appears that the black discolouring of the seed did not effect grain yield significantly.

• *Upgrading*

GG.2124/07/2/3:

THE DEVELOPMENT OF A COMPUTERISED DATABASE FOR BARLEY GERM PLASM. 1983-1984

M.T. Aartsma

A small grain germ plasm collection was initiated by Dr R.A. Kilpatrick at the Small Grain Centre during 1981. It soon became apparent that a computerised database would have to be developed. The task or developing the various programmes was assigned to Dr Frances Thatcher.

It was decided that the database would be run on the Burroughs computer - the only available computer facilities at the Small Grain Centre at that time. During 1984 a new personal computer as well as a very applicable database programme, D-Base III was purchased. This hard- and software solved all the problems with regard to computerisation. Since then this programme has been used very effectively for storage and retrieval of the relevant data.

This programme has now been updated by purchasing D-Base IV. The database of the germ plasm bank is now routinely done with the D-Base programme and no further research in this regard is necessary.

• *Crop science*

GG.2124/30/3/1:

LEAF NUMBER/APEX DEVELOPMENT STAGE RELATIONSHIP OF BARLEY IN THE WINTER RAINFALL AREA AS INFLUENCED BY CHEMICAL HERBICIDES. 1982-1990

H.A. Smit

It is generally accepted that barley is tolerant to hormone type herbicides at the 5-7 leaf stages, irrespective of cultivar, locality of production, planting date and climatic conditions. The correlation of leaf number and growth point development stages of barley was investigated in field trials.

The result indicated that 56 % of the plants sampled at the five leaf stage had a growth point development stage of less than seven. At the seven-leaf stage, however, only 4 % of the plants were younger than growth point development stage seven.

The trend of the data in the long run is that barley is susceptible to fenoxo herbicides at the five-leaf age and that more than 90 % of the plants are in a tolerant growth phase during the seven-leaf stage.

RYE

- *Upgrading*

GG.2125/07/2/3:

THE DEVELOPMENT OF A COMPUTERISED DATABASE FOR RYE GERM PLASM.
1983-1984

M.T. Aartsma

A small grain germ plasm collection was initiated by Dr R.A. Kilpatrick at the Small Grain Centre during 1981. It soon became apparent that a computerised database would have to be developed. The task of developing the various programmes was assigned to Dr Frances Thatcher.

It was decided that the database would be run on the Burroughs computer - the only available computer facilities at the Small Grain Centre at that time. During 1984 a new personal computer as well as a very applicable database programme, D-Base III was purchased. This hard- and software solved all the problems with regard to computerisation. Since then this programme has been used very effectively for storage and retrieval of the relevant data.

This programme has now been updated by purchasing D-Base IV. The database of the germ plasm bank is now routinely done with the D-Base programme and no further research in this regard is necessary.

OATS

- *Upgrading*

GG.2126/07/2/3:

THE DEVELOPMENT OF A COMPUTERISED DATABASE FOR OATS GERM PLASM.
1983-1984

M.T. Aartsma

A small grain germ plasm collection was initiated by Dr R.A. Kilpatrick at the Small Grain Centre during 1981. It soon became apparent that a computerised database would have to be developed. The task of developing the various programmes was assigned to Dr Frances Thatcher.

It was decided that the database would be run on the Burroughs computer - the only available computer facilities at the Small Grain Centre at that time. During 1984 a new personal computer as well as a very applicable database programme, D-Base III was purchased. This hard- and software solved all the problems with regard to computerisation. Since then this programme has been used very effectively for storage and retrieval of the relevant data.

This programme has now been updated by purchasing D-Base IV. The database of the germ plasm bank is now routinely done with the D-Base programme and no further research in this regard is necessary.

Protein and oil seeds

GROUNDNUTS

- *Physiology*

GG.2131/03, 1/1:

GROUNDNUTS: PARTITIONING ANALYSIS. 1981-1986
J. Dreyer

Sellie, the current groundnut cultivar outyields Natal Common, the oldest of the locally bred cultivars by 16 %. High yielding foreign cultivars after being introduced locally suffer from low yields. Research was conducted at Potchefstroom into the possible causes of the yield differences.

Crop and pod growth rates were determined throughout regular plant samples. Partitioning factors (PF) were determined for six local and foreign cultivars. The PF is defined as the amount of recently formed photosynthate which is translocated to the groundnut pods in comparison with the total dry matter production of the plant.

It was found that Sellie had a PF of 0,765 compared to Natal Common's PF of 0,606. Florunner had the highest PF (0,587) of all foreign cultivars.

- *Nutrition*

GG.2131/05/1/4:

THE INFLUENCE OF NITROGEN AND DAMINOZIDE ON THE PRODUCTION OF
RUNNER TYPE GROUNDNUTS. 1985-1988

C.J. Swanevelder

Daminozide (succinic acid 2,2-dimethylhydrazide) a growth retardant, was used in field trials over two seasons (1985/86) at Potchefstroom and Vaalharts in combination with nitrogen fertiliser. The nitrogen was applied at 0, 10, 20 and 30 kg ha⁻¹ as LAN and daminozide applications started at seven days after emergence and continued for 14, 21, 35 and 49 days with control as a fifth treatment where the equivalent of 0, 500, 750, 1 000 and 1 250 g daminozide ha⁻¹ was applied.

Pod and seed yields were unaffected by nitrogen fertiliser but were reduced slightly by increasing time of treatment with daminozide. At Potchefstroom the longer periods of treatment decreased yields more than at Vaalharts. The shelling percentage was reduced significantly by treating the peanuts for a period of 49 days compared to shorter periods.

- *Pests*

GG.2131/20/2/6:

MASS CULTURING OF *DITYLENCHUS DESTRUCTOR* TO OBTAIN LARGE QUANTITIES
OF INOCULUM. 1987-1988

P.C W. van der Walt

Following the discovery that *Ditylenchus destructor* occurs in hulls and seeds of groundnuts in South Africa, a method for the mass culture of this nematode on groundnut callus tissue was developed. The callus tissue was established on a nutrient medium modified after Murashige & Skoog (1962).

The nematodes were surface sterilised with a 0,1 % HgCl₂ solution. Five weeks after inoculation, a 600-fold increase in nematode numbers was observed.

GG.2131/20/2/10:

HISTOPATHOLOGY OF *D. DESTRUCTOR* IN PEANUTS. 1987-1988
B.L. Jones

The time and mode of entry, and development of *Ditylenchus destructor* in peanut were studied in field and greenhouse experiments. Few nematodes were present in the cortex of the roots. At 90-120 days after planting, *D. destructor* was observed in the exocarp at the base of the pod near the point of connection with the peg. The peg was invaded from this primary infection site. The endocarp of the hull was usually penetrated through openings at the base of the mesocarp and sometimes at the pod apex.

Numerous *D. destructor* were present in the testa and the vascular bundles. Nematodes were found in the embryo but not in the cotyledons. The histopathology of *D. destructor* closely resembles that of the peanut testa nematode, *Aphelenchoides arachidis* Bos.

- *Crop science*

GG.2131/30/2/2:

RIDGE PLANTING OF GROUNDNUTS FOR LIMITING BLACK HULL. 1982-1986
J. Dreyer

Pod rot and especially black hull, caused by *Chalara elegans* became a severe problem on irrigated groundnut fields in the Northern Cape and Western Transvaal. Trials were conducted at Vaalharts Research Station to investigate the influence of six chemicals, three irrigation rates, 50, 100 and 150 mm evaporation from a class A tank, two seedbed types and harvesting dates at 120, 140 and 160 days after planting on the occurrence of the disease.

The percentage occurrence of clean pods shows a high significant interaction with different factors. The moisture level x seasonal growth length of 120 days gives a favourable percentage (69,8 %) of clean pods against the lowest level (52,2 %) with a 160 day growing season. The planting method x harvest date interaction shows significantly more healthy pods when planted on raised beds instead of the usual planting methods.

At the chemical x planting method interaction there is a significant difference in favour of planting on a raised bed with chemicals. The highest percentage (79,4) healthy pods were achieved where the plants on the raised bed were sprayed with etaconazole.

With disease-free pod yield as a starting point the position was totally reversed. In this case a significant higher yield of 2 483 against 2 080 kg/ha were obtained from a raised bed with a limited growing

season. Where chemicals and planting methods were compared raised seed beds had the highest clean pod yield. This tendency was repeated with seed yields. Total seed yield was significantly higher for the normal way of planting but better yields were obtained from raised seed beds.

Except for the raised seed bed method, adequate irrigation (50 mm evaporation) contributed significantly in relation with a early harvest date (120 days growing season) to a yield of sound kernels.

GG.2131/30/2/4:

THE INFLUENCE OF HARVESTING AND PICKING DATES ON MOULD
CONTAMINATION OF GROUNDNUTS. 1984-1987

C.J. Swanevelder

A trial was conducted to determine the influence of harvesting and picking dates on the quality of groundnuts during the 1984 to 1986 seasons. Unfortunately very little rain occurred during those seasons, during the lesser half of the growing seasons and particularly during the harvesting periods. Only at Rustenburg during the 1984/85 season was there enough rain on the stacks to have a noticeable effect on quality.

The cultivar Sellie was used and was lifted at 130, 140, 150, 160 and 180 days (Potchefstroom 1986/87) after planting. The lifted groundnuts were stacked on the field and picked afterwards at 14 day-intervals up to 56 days after lifting. A control plot was picked at lifting and cured by artificial drying. During the 1984/85 season trials were conducted at Delareyville, Koppies, Potchefstroom, Rustenburg and Viljoenskroon with trials at Potchefstroom and Viljoenskroon the following season and at Potchefstroom only the last season.

Drought conditions prior to and after lifting occurred during all the seasons resulting in very little differences between treatments. Only at Rustenburg, during the 1984/85 season, when 70 mm rain was recorded after the first lifting date did noticeable difference appear in the quantitative occurrence of aflatoxin.

GG.2131/30/5/1:

THE INFLUENCE OF MULCHING ON MOULD CONTAMINATION OF GROUNDNUTS.
1984-1987

C.J. Swanevelder

Trials were conducted where the influence of mulching on groundnut quality, mould and yield were investigated at Viljoenskroon and Hartebeesfontein.

The trials started in 1984 on a field with wheat stubble in the Viljoenskroon area and with maize stubble in the Hartebeesfontein area.

Groundnuts were planted at Viljoenskroon on ridges and on the flat with stubble and with stubble removed at 75- and 150-cm rows. Higher yields were obtained with 75-cm rows and more mould was observed from the flat clean plots than from the ridged and stubble plots (Table 1). During January, February and March 124 mm rain was measured.

TABLE 1 - Results of the 1984/85 stubble trial at Viljoenskroon

Treatment	Seed yield kg/ha			Mould infection (%)		
	75 cm	150 cm	Mean	75 cm	150 cm	Mean
Raised bed	1 494	1 287	1 390	5,8	5,7	5,75
Flat	1 533	1 093	1 313	3,6	7,8	5,7
Raised and stubble	2 052	1 609	1 830	5,1	5,0	5,05
Flat and stubble	1 664	1 053	1 359	5,7	4,5	5,6
Mean	1 686	1 260		5,1	5,4	
CV (%)	25,3					20,8
LSD (0,05)	398					1,97

At Hartebeesfontein seed yield and mould infection was increased in a trial where clean cultivation was compared to stubble and tine seedbed preparation (Table 2).

During the 1985/86 season the trial was planted on maize stubble where stubble was removed for the control. As a third treatment additional stubble was supplied and spread out as a thin layer on top before planting. The results are shown in Table 3.

Stubble reduced yield significantly but had no effect on quality aspects.

TABLE 2 - Seed yield (kg/ha) and mould infection (%) in a seedbed trial at Hartebeesfontein 1984/85

Treatment	Seed yield (kg/ha)	Mould infection (%)
Clean cultivation	835	0,95
Tine and stubble	976	0,45
Tine	1 123	2,15
Mean	1 526	1,50
CV (%)	6,6	25,10
LSD (0,05)	326	0,66

TABLE 3 - Results of the 1985/86 stubble trial at Viljoenskroon

Observation	Treatment			Mean	LSD	CV
	Stubble	Additional stubble	Control			
Pod yield (kg/ha)	2 670	2 545	2 986	2 734	210	3,4
Seed yield (kg/ha)	1 810	1 650	1 935	1 798	78,4	1,9
Shelling (%)	67,7	64,5	64,7	65,6	5,3	3,5
Dead plants (%)	10	2,7	5,3	6,0	12,7	93,8
Unhealthy pods	5,0	4,7	4,1	4,6	1,5	14
Mould infected seeds (%)	1,8	1,2	1,7	1,6	1,2	33

During the 1986/87 season implements were used to facilitate the treatments. The stubble was removed by tines connected to the planter's seed furrow opener. The results show no difference between the different treatments. This may be due to low rainfall during the last part of the growing season.

Stubble increased mould infection at Hartebeesfontein. Wet conditions during 1984/85 (23 mm compared to 121 during 1985/86 and 74 mm for 1988/89 during January to March) increased mould development, otherwise very little positive or negative effects were observed. Although a technique was developed to plant groundnuts commercially on ridges with most of the stubble in a ditch between the rows, this could not be propagated as a viable practice because of variable effect on mould occurrence.

SOYBEANS

• Nutrition

GG.2133/05/1/1: THE INTERACTION OF LIME ON NITROGEN, PHOSPHORUS AND POTASSIUM FERTILISATION OF SOYBEANS. 1983-1988
J. Chapman

Field trials were carried out over a three-year period at Dundee Agricultural Station on soil of the Avalon form (Avalon series) to study the effects of lime, gypsum and borax applications on the growth and yield of the soybean plant. The area is classified as Bioclimatic Group 8, the dry phase of the Tall grass veld, the mean annual rainfall being 720 mm.

The experiment was commenced during the 1973/74 season. Firstly the trial was planted to sunflowers and later groundnuts. Soybeans were first planted during the 1980/81 season.

The initial soil analysis of the site was: P 17 ppm; Ca 0,32 meq/100 g; Mg 0,12 meq/100 g; K 0,11 meq/100 g; Na 0,02 meq/100 g; Al 0,88 meq/100 g. The soil pH level was 3,9 (KCl) and aluminium saturation 47 %.

Applications of lime and gypsum were made for the sunflower crop in 1973/74 and 1974/75 at the following rates: 0; 1 600 and 2 400 kg ha⁻¹. Borax was applied in both seasons at 0; 5; 10 and 30 kg ha⁻¹. In both these seasons the following applications of N, P and K were made:

1973/74	N 120	P 26	K 42 kg ha ⁻¹
1974/75	N 134	P 30	K 50 kg ha ⁻¹

Sunflowers were planted until 1976/78 and groundnuts were planted until 1979/80. Plots were split in 1977/78 for the lime, gypsum and borax treatments. A sub-plot of each treatment was given no further applications of soil ameliorants or borax to facilitate a study of residual effects. Soybeans were planted in the 1980/81, 1981/82 and 1982/83 seasons. At the start of the 1980/81 and 1982/83 seasons soil ameliorants and borax were applied as for the 1977/78 season. At the start of the 1981/82 season soil analysis indicated low levels of K, Mg and P and the following amounts of these elements were applied (all in kg ha⁻¹): 50 kg K (as KCl); 20 kg Mg (as MgO) and 60 kg P (as double superphosphate). At the start of the 1982/83 season the following amounts using the same fertilisers were applied: 50 kg K; 20 kg Mg and 30 kg P.

The experimental design was an unreplicated 4³ factorial in blocks with the lime, gypsum, borax treatments complete confounded.

The cultivar Forrest was planted in all seasons. The planting dates were 10/11/80, 23/11/81 and 18/11/82.

The response trend to the soil ameliorants over the three seasons was similar although the magnitude differed between seasons owing to climatic variations.

Applications of calcitic lime increased soil pH and reduced aluminium toxicity. Applications of gypsum had little effect on soil pH and only slightly reduced the percentage aluminium saturation. An ANOVA

indicated that liming improved the growth and yield of the soybean. Application of gypsum only brought about a slight improvement in growth and yield. Although the soil B level at the trial site was very low there was no response to applications of this element suggesting that the soybean has a low B requirement.

There was a statistically significant negative association between the percentage aluminium saturation and root nodulation and a statistically significant positive association between root nodulation and plant size. There were positive statistical associations between plant size and seed yield.

It was concluded that basically liming increased seed yield by reducing aluminium toxicity. This resulted in a larger healthier root system which was more efficient at moisture and nutrient uptake. It may also be assumed that the reduction of free aluminium in the soil would improve the availability and uptake of P and the translocation of this element within the plant. The reduction in free aluminium in the soil also improved root nodulation which is important in nitrogen nutrition of the soybean crop. All of these factors by contributing to better growth and a larger plant increased seed yield. Gypsum, being less efficient at reducing aluminium toxicity, only brought about a slight increase in seed yield.

For soybean crop on an Avalon soil it is recommended that liming to a soil pH level of 4,2-4,5 be carried out.

Other agronomy crops

COTTON

● Pathology

TK.2141/19/1/1: OCCURRENCE OF DIFFERENT STRAINS OF *XANTHOMONAS CAMPESTRIS* PV. *MALVACEARUM* ON COTTON IN SOUTH AFRICA. 1983-1989
A. Swanepoel

One-hundred-and-fifty-two different isolates of *Xanthomonas malvacearum* which is responsible for bacterial blight disease of cotton were collected throughout most of the cotton growing areas during two consecutive years. The isolates were identified by using a detached leaf technique on a differential host reaction test.

By using this method only 66 of these isolates would be differentiated into known races of the pathogen by using the system approved by the Cotton Disease Council of the U.S.A. By this method races 2, 3, 6, 9, 12, 15, 16 and 18 could be differentiated.

There were, however, many isolates which did not induce the characteristic results needed and may be local races which may be determined by using new differential hosts. It is necessary to determine these local races in order to breed for resistance against local strains.

TK.2141/19/1/2: SEEDLING DISEASE OF COTTON. 1985-1989
A. le Roux

Rhizoctonia solani has been identified as the major pathogen involved in the seedling disease complex of cotton in the RSA which is responsible for known symptoms such as seed rot, pre-emergence rotting of the radicle, post-emergence hypocotyl rot, stem canker and wire stem.

Isolates of *R. solani* pathogenic to cotton belongs to anastomes group AG4. Other pathogenic species include *Fusarium solani*, *F. oxysporum*, *Alternaria alternata* and *Macrophomina phaseolina*.

In a series of greenhouse and field trials, the registered captab seed-treatment application proved to be ineffective against seedling disease. Several single as well as mixed seed-treatment fungicide formulations consistently and significantly controlled seedling disease caused by *R. solani*. It included carboxin/thiram, captab/quintozene, iprodione, pencycuron/captab, tolclofos-methyl and triadimenol.

As a result, the carboxin/thiram seed-treatment application has been registered in 1989. A new product namely CGA 142705 (Beret) needs further investigation.

● Water requirements

TK.2141/31/1/1: THE EFFECT OF MOISTURE DEFICITS DURING VARIOUS GROWTH PERIODS ON COTTON YIELDS. 1977-1989
M.C. Dippenaar

The effect of soil water deficits during various periods of the cotton season was determined. The cotton growing season at the Loskop Experimental Station was divided into four periods. During each of these

periods, plots were subjected to a moisture stress for periods of 25 to 30 days. Some plots received two stress periods interrupted by irrigation. Dryland plots and plots irrigated throughout the season were also included. The physiological plant age was calculated as day degrees (DD_{13}) after planting.

The effect of a period of moisture stress on growth and yield was confounded with the intensity of the drought induced with the duration of this dry spell, and with the remainder of the physiologically active season (RPS). RPS was calculated as a fraction of the total DD_{13} between the onset of square formation and 30 April. The leaf number per plant over the season was used as an index, similar to the crop factor to calculate potential evapotranspiration (ET_{pot}) per week. ET_{pot} values were used to calculate the cumulative effective evapotranspiration (ET_e) using soil water content plus rainfall and irrigation as a moisture index and RPS as a time index.

(ET_e) and RPS accounted for 48,6 % of the yield variation or reduction in yield. Seed cotton yield was reduced more by stress early in the growing season. Yield reductions of more than 50 % were measured when moisture stresses occurred during the first 20 % of the season. This reduction in seed cotton yield amounted to 136 kg per ha (i.e. 4 %) for 10 % of the physiological season. Yield increased linearly with (ET_e) at a rate of 41,7 kg per 100 mm of water used efficiently. During stress periods early in the season the soil water content was depleted to wilting point over the profile sampled of 90 cm.

TOBACCO

• Pests

TK.2141/20/1/5:

INFLUENCE OF SOIL CHARACTERISTICS ON THE DECOMPOSITION OF CARBOFURAN.
1985-1989

E.G. Eulitz, R. v.d. Westhuizen and P. van Dyk

Using a bio-assay the influence of certain soil characteristics on the decomposition of carbofuran in different soils was investigated in a glasshouse at $250^{\circ}\text{C} \pm 20^{\circ}\text{C}$. In the bio-assay aphid (*Myzus persicae*) infested tobacco seedlings (cultivar TL33) were planted into carbofuran-treated soil at weekly intervals.

The effect of carbofuran on the aphids were indexed seven days after planting. Duration of effectivity was eight weeks in loam sand (10 % clay, pH 5,73), three weeks in sandy loam (20 % clay, pH 8,11), four weeks in black clay (46 % clay, pH 7,18) and eight weeks in red clay (50 % clay, pH 5,49). Duration of effectivity in other soil types varies between these limits.

By changing the soil pH artificially the duration of effectivity was reduced when the pH value was increased above a value of six. Fertilisation with lime stone ammonium nitrate and a mixture (2:3:4 30 %) only influenced the duration of effectivity when the fertiliser acidify the soil to a pH value below six. Pasteurisation of the soils had no influence on longevity of carbofuran.

From these results it is concluded that in the soils tested only the soil pH influenced the duration of effectivity of carbofuran and that a soil pH of 6,0 and higher increased decomposition of carbofuran.

HORTICULTURE RESEARCH

Tuber crops

POTATOES

• Nutrition

GS.2411/05/1/1:

FERTILISER REQUIREMENTS OF POTATOES AT LYDENBURG. 1980-1989
K.P. Prinsloo

Fertilisation experiments were carried out under dryland cultivation at Lydenburg to determine the best fertiliser applications for the soils of the Seed Certification Scheme farm. It is essential that the basic seed producers are supplied with high quality seed potatoes. The influence of nitrogen, phosphorus and potassium fertilisation were investigated.

The results indicated a sharp levelling off in the yield increase after 70 kg N ha^{-1} on the shallow soils with a relatively high carbon content (3,69 %). Nitrogen levels of 130 kg N ha^{-1} and higher resulted in a significant lower relative density. The increase in the N fertilisation increased the percentage nitrogen, phosphorus and potassium in the leaves at tuber initiation significantly, whereas calcium and magnesium content were significantly reduced.

Yields were significantly increased up to the first levels of phosphate applications (50-70 kg P ha⁻¹) irrespective of season or P content of soils. Indications of phosphate requirements higher than 100 kg ha⁻¹ were observed in soils with very low P content. Phosphorus application improved the relative density and the dry chip colour in the 1984/85 and 1985/86 seasons. The increase of phosphorus fertiliser increased the nitrogen and phosphorus contents in the leaves according to leaf analysis done during tuber initiation.

The increase in potassium applications from 0 to 120 kg ha⁻¹ increased the yield significantly where the percentage potassium regarding the cation exchange capacity (CEC) was less than 80 %. Where the potassium was high (47,3 %) of CEC, fertilisation with potassium did not increase the yield significantly. Potassium fertilisation of 120 kg ha⁻¹ and higher significantly decreased the relative density of tubers. The increase of potassium fertilisation from 0-60 kg ha⁻¹ significantly increased the relative density but a further increase from 60-120 kg ha⁻¹ potassium significantly decreased the relative density during the 1986/87 season.

• *Pathology*

GS.2411/19/3/9: ELIMINATION OF NON-SPECIFIC REACTIONS IN THE DETECTION OF POTATO VIRUSES IN POTATOES. 1986-1989
P.J. Prins

The aim of this research was the elimination of non-specific reactions which frequently occurred in ELISA tests when potato tuber and plant sap samples were monitored from material grown on the farms of the Potato Board in the Sabie/Lydenburg area. This problem was experienced since the implementation of the ELISA test in 1982. However, since 1986 this phenomenon has decreased drastically until it is no longer a problem today.

Additives to buffer solutions were reported to overcome these problems. Sixty-four buffer variations were tested together with the standard sample/conjugate buffer solutions included in the commercially available ELISA kits, as a control. Four of these buffer variations resulted in lower non-specific reactions in the potato leafroll virus tests and a simultaneous increase of specific results. These were phosphate buffered saline (PBS) containing 0,5 % polyvinylpyrrolidone (PVP) and 2 % egg albumin with the addition of either 0,01 M sodium sulphite, 0,000 M dithiothreitol (DTT) or 0,01 M diethyldithiocarbamate (DIECA). PVP was excluded when DIECA was used as an additive. The potato virus Y tests did not benefit from these buffer manipulations.

Several direct and indirect forms of ELISA have been developed and found to be comparable to or have certain advantages over the standard double antibody sandwich ELISA (DAS-ELISA). The use of F(ab)₂ and 2 animal spp. indirect ELISA procedures resulted in lower non-specific reactions when compared with the conventional DAS-ELISA for the detection of potato leafroll virus and potato virus Y. Specific reactions were similar to those obtained with DAS-ELISA.

Dot-ELISA performed on nitro cellulose membranes were more sensitive for potato leafroll virus than the ELISA test in the conventional microtitre plates only when samples were pre-incubated at 50 °C for 10 min. Results of Dot-ELISA tests were similar for potato virus Y and non-infected samples to those in microtitre plates.

These research results proved that buffer manipulations and/or alternative ELISA procedures can overcome non-specific reactions and investigators should be encouraged to use several procedures if problems may arise using the standard ELISA test.

Vegetables

TOMATOES

• *Water requirements*

GS.2421/31/1/1: MEASUREMENT OF TOMATO LEAF WATER POTENTIAL. 1985-1989
H.A. Davel

The aim of this study was to master the techniques and establish reliable guidelines for the measurement of tomato leaf water potential components in the field situation, using thermocouple psychrometers in swagelok sampling chambers. Once criteria were established the psychrometric leaf water potential readings were compared with xylem potential measurements obtained, using a pressure chamber.

The time taken for the thermo couple junctions to come into thermal equilibrium, with the waterbath at 30 °C was always less than 15 minutes. The time taken for the various salt solutions to equilibrate, varied

with the osmotic potentials of the solutions. The higher the osmotic potential the longer it took to equilibrate in the chamber.

The criteria used throughout the study, on deciding on the optimum time of measurement, were that the samples must have reached a period of relative stability and that the standard error of the observed readings be as small as possible. This makes it essential that multiple samples have to be monitored before an optimum time of measurement can be established. Using these criteria, the optimum time for taking leaf water and osmotic potential readings in the waterbath at 30 °C, was 3 and 6 hours, respectively.

The side of the leaf facing the screen-cage had an effect on the eventual leaf water potential readings obtained. The adaxial side of the leaf always initially gave a higher reading than the abaxial side. The difference was, however, not significant if the samples were left in the waterbath for 2,5 hours or longer.

The size of the leaf samples cut from the cultivars Manapal and UC 82B had a significant effect on the leaf water potential readings obtained. No significant differences in the leaf water or osmotic potential readings could, however, be found between the 20 mm x 40 mm sample and bigger samples. The 20 mm x 40 mm sample was best suited for use in the specific chambers as they are the easiest size to load and handle and completely screened the junctions from the chamber walls. The size of the sample was also such that it could easily be cut from a young leaflet.

No significant differences could be found in any of the leaf water potential components between leaves that had been washed or left unwashed, prior to sampling. The time lapse between cutting, loading and sealing the leaf into the chamber caused a significant decrease in the measured leaf water potential. The 15 seconds which it normally took in this study to load the samples, however, had no significant effect on the readings obtained.

Significant differences in leaf water, osmotic and pressure potentials could be found between the various leaves in the top half of the leaf canopy. There was, however, no noticeable pattern as to the variation between consecutive leaves in the canopy. No significant differences could be found in the leaf water potential components of individual leaflets on a leaf.

Relationships between the measurements obtained, using the pressure chamber and thermocouple psychrometers, were established. Significant differences were found between the two sample sizes used, namely the terminal leaflet and the larger sample consisting of the three terminal leaflets. The elevation of the two regression lines differed significantly though the slope of the lines were the same. A possible explanation for this could be the differences in the length of the petiole/rachis between the two samples. When using a pressure chamber the terminal leaflet gave the most acceptable readings of stressed plants, whereas a better estimation of leaf water potential of unstressed plants was obtained using the three terminal leaflets.

This study gives broad guidelines as to the use of thermocouple psychrometers in swagelok calibration chambers for the measurement of tomato leaf water potential components. These guidelines will, however, have to be constantly evaluated and upgraded as the effects of other factors that may play a role in the measurement are identified.

ONIONS

• Pathology

GS.2422/19/1/3:

POST-HARVEST DECAY OF ONIONS BY *ASPERGILLUS NIGER* CONTROL MEASURES.
1986-1989

S.P. Naude

Fifteen different fungicides were evaluated in vitro of *Aspergillus niger*, *Fusarium oxysporum* and *Botrytis allii*. The most promising fungicides were prochloraz and captafol. In the case of dicloran, imazalil and penconazole the fungal growth was not affected, but a distinct suppression of sporulation occurred.

Prochloraz, imazalil, captafol and penconazole were also evaluated in vivo. No rotting as a result of fungal pathogens occurred and control was aimed exclusively at *Aspergillus* spp. and *Penicillium spinulosum* which occurred on the exterior of the bulbs. Prochloraz was the most effective fungicide against *Aspergillus* spp. and penconazole against *Penicillium spinulosum*.

There was very little difference in percentage mass loss between the treatments and the controls. Rotting which occurred during storage was secondary and the result of bacterial infection following insect damage. The effect of the same four fungicides on spore germination, morphology and subsequent development of the fungus was determined by means of freeze scanning microscopy.

Prochloraz and imazalil inhibited spore germination almost completely. Captafol and penconazole also had an effect on spore germination but in these cases hyphal growth still occurred but sporulation was inhibited.

The pathogenesis of *Aspergillus ficuum* (synonym *A. niger*) on onion bulbs was investigated by means of light and scanning electron microscopy. It was found that wounding is a prerequisite to infection, tissue death precedes colonisation of the fungus, and that pectic enzymes play a distinct role in pathogenesis. Therefore, the fungus cannot be regarded as a specialised plant pathogen and is classed among the perthophytes.

The presence of fungal hyphae in living, as well as dead tissue, indicates the opportunistic nature of the fungus and explains why it is difficult to control the organism. Under optimal storage conditions destructive pathogenesis rarely occurs, and the fungus is mostly found in saprophytic association with the outer wrapper scales of the onion bulb.

The occurrence of the fungus on stored onions in South Africa is rather of esthetical than of economical importance because it seldom results in rotting.

COLE CROPS

• Crop science

GS.2423/30/1/1:

COLE CROPS: PHASE-II EVALUATION OF CABBAGE CULTIVARS AND BREEDING
LINES. 1975-1990

P.J. Henrico

The objective of these experiments was to evaluate new cabbage cultivars. Altogether 54 F₁ hybrids, breeding lines and open-pollinated cultivars were tested at Roodeplaat, Elsenburg, Glen, George, Addo, Cedara and Nelspruit. Gloria F₁, Green Coronet, Transmark and Conquistador gave the best yield and quality and are recommended for winter production.

In view of the good yield, quality, and resistance to black rot, Hercules, Transmark and Green Star are recommended for summer production. In areas where black rot is no problem, Gloria F₁ can also be planted for summer production. The cultivars Shamrock, Big Cropper, N.S. Cross, Grand Slam and Magnum gave reasonably good results and can be recommended as alternatives. Rotan belongs to this group but the mature heads are susceptible to frost damage.

Special Glory, Brunswick, All Head, Bonanza, Stonehead, Kopenhagen Market, Early Jersey, Wakefield, K.Y. Cross, Firmata, Globe Y.R. and Esperanta are susceptible to black rot in different degrees.

In the Eastern Cape most cultivars gave favourable results when sown in August. The cultivars Rotan, Gloria, Hercules, Shamrock and Domia can also be sown successfully any time from April until July.

In the Free State most cultivars gave favourable results when sown from May till July. The January to February sowings had the highest incidence of diseases. The cultivar Fabula gave good results when sown any time from May until January and K.Y. Cross can be sown any time from July until January. Big Cropper and Bonanza can be sown with success from December until February.

The open-pollinated cultivar, Rolag, that was developed at V.O.P.R.I. compared very favourably with other open-pollinated cultivars. It produced good yields and is resistant to black rot. In the trials over the last few years at Roodeplaat, the yield of Rolag compared favourably with the best of the new hybrids, although the quality was poorer.

VINE CROPS

• Technology

GS.2426/31/1/1:

VINE CROPS: COLD STORAGE OF MELONS. 1987-1989

A.G. Comrie

The fruit of 'Honeydew' melon was either treated with 1 000 ppm ethylene for 24 hours at 20 °C or held untreated at 20 °C for 24 hours before storage for 28 days at 3, 6, 9, 12 or 15 °C. The fruit was then held for four days at 20 °C before being evaluated. The incidence of cold injury (CI) decreased from between 90-100 % at 3 °C to 0 % at 12 °C. Ethylene reduced the mean fruit area showing CI at 3 °C significantly but appeared to have little effect at higher temperatures. Small brown spots, some of which later developed rots, were found on many fruit, particularly at 9 °C where between 95-100 % fruit was affected.

Ethylene-treated fruit was more severely affected at all temperatures. The incidence of surface rots was closely related to CI ($r=0,855$) and appeared to be primarily secondary. Surface rots decreased from between 60-70 % at 3 °C to less than 10 % at 15 °C. Stem rots were common and temperature appeared to have little effect other than on the species of organism involved. Lower storage temperatures depressed the sugar content of control fruit to levels significantly lower than at harvest, whereas ethylene treated fruit showed the opposite trend. The percentage marketable fruit, based on appearance, sugar content and internal quality, increased from 0 % at 3 °C to between 65 % (ethylene) to 85 % (control) at 15 °C.

SUNDRY VEGETABLES

• Physiology

GS.2427/03/1/1:

SUNDRY VEGETABLES: THE RAPID MULTIPLICATION OF ASPARAGUS (*ASPARAGUS OFFICINALIS*) BY MEANS OF TISSUE CULTURE. 1986-1989

M.M. Slabbert

Asparagus is generally propagated from seed, but the variation in yield of the plants poses a serious problem. Since asparagus plants have an average harvest period of 10-15 years, and a great financial and labour input are required before any economic results can be obtained, improvement of the cultivars by breeding is necessary. At the Vegetable and Ornamental Plant Research Institute a breeding programme of a "super male asparagus plant" by means of pollen culture, is in progress. The breeding of this plant can be linked to the rapid multiplication thereof in vitro, because it is a practical, applicable method of vegetative multiplication where the daughter plants will have all the same characteristics as the mother plant.

Ex-plant material has been derived from sterile seedlings of *Asparagus officinalis* (cultivar Franklim) which have been germinated in vitro. Segments from the seedlings consisting of the shoot tips, buds, internodes with cladophylls and the young shoots, were inoculated on a modified Murashige and Skoog's (MMS) medium. Different concentrations and combinations of growth regulators, namely naphthaleneacetic acid (NAA) ($0,1 \text{ mg dm}^{-3}$) in combination with benzylaminopurine (BAP) ($0,1$; $0,5$; $1,0$ and $2,0 \text{ mg dm}^{-3}$) and kinetin ($0,1$ and $0,2 \text{ mg dm}^{-3}$) respectively, have been tested to determine their influence on the regeneration and growth of the asparagus plantlets. Cultures were incubated at 20 and 27 °C, respectively, with a 16/8 h light/dark period. The plantlets were rooted by inoculating it on MMS medium with different combinations of NAA, kinetin and ancymidol. Prior to transplanting to soil, the plants were first hardened off to ensure the survival of the plants. This was done by transferring the plantlets to a simple MS medium and simultaneously exposing them to a higher light intensity of $62,5 \mu\text{Em}^{-2} \text{ s}^{-1}$.

The young shoots, buds and shoot tips generally regenerated more vigorous plantlets than the internodes with cladophylls. Plantlets on MMS medium with BAP regenerated short, thick and deformed shoots, whereas vigorous plantlets were initiated on MMS medium with kinetin whereafter the latter was successfully multiplied several times on the same medium. Plantlets incubated at 27 °C regenerated more vigorous plantlets with a higher number of buds, cladophylls and shoots than those maintained at 20 °C. The highest percentage rooting was obtained on MMS medium with $1,25 \text{ mg dm}^{-3}$ ancymidol. A high percentage of survival was ensured by hardening off the plantlets prior to transplanting to soil.

CHICORY

• Pathology

GS.2428/19/1/1:

DETERMINATION OF THE CAUSAL ORGANISM(S) OF BLACK ROOT ROT IN CHICORY. 1985-1989

J.F. Ferreira

Organisms, isolated from chicory roots with black root rot symptoms collected on farms in the Eastern Cape, were tested for pathogenicity in laboratory and greenhouse trials. Typical black root rot lesions developed when either unwounded or wounded roots were inoculated with *Thielaviopsis basicola* at different temperatures.

Wounding promoted or was a prerequisite for infection by *Macrophomina phaseolina*, *Alternaria alternata*, *Fusarium oxysporum*, *Phoma* spp., *Sclerotium rolfsii* and *Sclerotinia sclerotiorum*. *S. rolfsii* and *S. sclerotiorum* did not only cause symptoms similar to those of black root rot, but also a soft rot of the

chicory roots. *Penicillium pinophilum*, *A. alternata*, *Phoma* spp. and *M. phaseolina* in association with *T. basicola* did not increase the percentage wilting or death of inoculated plants.

GS.2428/19/1/3:

CHEMICAL CONTROL OF BLACK ROT IN CHICORY. 1986-1989
J.F. Ferreira

The systemic fungicides benomyl, propiconazole and triadimenol inhibited *Thielaviopsis basicola* in vitro, but did not control black root rot in glasshouse or field trials. At higher dosages propiconazole and triadimenol were phytotoxic to chicory and caused stubby root or dying of the plants.

The increase of calcium levels in the soil resulted in a higher calcium content in the chicory leaves, but not in the roots. Calcium applications had, therefore, no effect on the occurrence of black root rot in chicory.

Flowers and ornamental plants

PROTEAS

• Pests

GS.2431/20/2/2:

TAXONOMIC STUDIES OF MITES ON PROTEAS. 1986-1990
J.H. Coetzee

The aim of this study is to identify arthropods (other than of the class Insecta) occurring on Proteacea. These arthropods belong to the following groups: Acarina, Araneae, Diplopoda and Chilopoda. The most important mites encountered are the "witches broom mite" (*Aceria proteae*). Witches broom may be controlled by means of sanitation, whereas itch mites on flowers are controlled by post-harvest treatment.

The spiders (Araneae) play an important role as natural enemies of insects and mites, although the group causes phytosanitary problems. Between January 1985 and December 1985 a monthly survey of spiders (Araneae) was carried out on five Proteaceae species in the south-western Cape. Thirty-five genera representing 15 spider families were recorded. Of the 837 spiders collected 37,2 % belonged to the Salticidae, 22,5 % to the Clubionidae, 9,1 % to the Theridiidae, 8,2 % to the Araneidae and 7,0 % to the Philodromidae. Sixty-one spiders were recorded from the inflorescences. Great similarity exists between the five plant species in regard to the spider families present, but differences were found in the number of spiders recorded from each plant species.

CUT FLOWERS

• Physiology

GS.2433/03/1/2:

RAPID MULTIPLICATION OF BULBOUS CUT FLOWERS IN VITRO: *ORNITHOGALUM MACULATUM*. 1983-1990
J.G. Niederwieser

Ornithogalum maculatum possesses good cut flower qualities and is currently used in a breeding programme conducted with *Ornithogalum*. In contrast with many other *Ornithogalum* species, *O. maculatum* is propagated readily by seed, but vegetative propagation is limited. The in vitro propagation of *O. maculatum* was thus investigated.

Ornithogalum maculatum was rapidly propagated in vitro from leaf tissue, provided the leaves were cut from donor plants of which the florets had opened. The growth of culture consisting of callus, adventitious shoots and leaf sections was stimulated by factorial combinations of benzylamino purine at 0,5 to 2 mg/ℓ and naphthalacetic acid at 0,01 to 2 mg/ℓ. The sucrose concentration affected the growth of shoots and callus. At 30 g/ℓ sucrose, shoots developed roots and at 50-70 g/ℓ, large bulblets with short leaves developed.

GS.2433/03/1/4:

RAPID MULTIPLICATION OF BULBOUS CUT FLOWERS IN VITRO: *ORNITHOGALUM*. 1986-1990
P.A. Landby

A study of factors affecting morphogenesis on leaf ex-plants of *Ornithogalum* cv. Rollow and *O. maculatum* was made to facilitate the rapid multiplication of products of the breeding programme of the Vegetable and

Ornamental Plant Research Institute. In this study, no plantlets were obtained from *O. maculatum*. Plantlets were obtained on tissue of Rollow and the number of plantlets was related to the culture period.

The regeneration potential of leaf tissue of Rollow was affected by the developmental stage of the donor plant as well as the age of the tissue. The best tissue proved to be tissue from the basal end of leaves of plants before flowering. Plant formation on ex-plants of 1 x 1 cm occurred near the cut surfaces, additional wounding did not stimulate regeneration.

Naphthaleneacetic acid (NAA) and benzylaminopurine (BA), though not essential for morphogenesis, stimulated plant initiation. Unbalanced growth regulator ratios affected plantlet incidence and morphology. The optimal sucrose concentration was 30 g/l. No plantlets were formed when the sucrose concentrations was less than 10 g/l. Supra-optimal sucrose concentrations inhibited shoot elongation and stimulated plantlet initiation where phytohormones were not added to the medium. The agar concentration (0-20 g/l) and the pH (5-7) of the medium had no effect on the number of plantlets formed. The water potential of the basal medium declined insufficiently over the culture period to constitute a physical stress on ex-plants.

Significantly more plantlets were initiated on ex-plants cultured at 22-32 °C than at 15 °C. Leaf development was stimulated at temperatures between 22 and 25 °C, whereas the diameter of bulblets increased to a maximum at 32 °C.

Callus formation was stimulated by increasing sucrose concentrations and was inhibited by increasing culture temperatures.

Contamination by micro-organisms varied depending on the source, age and stage of development of the ex-plant and pH extremes.

The most important determinant of the rate of increase of in vitro formed plantlets was the initial ex-plant.

• Pathology

GS.2433/19/1/2:

HERBACIOUS CUT FLOWERS: SYNTHESIS AND CLONING OF A cDNA PROBE FOR CHRYSANTHEMUM STUNT VIROID. 1985-1989

G.C. Bothma

The aim of the facet was to produce double stranded complementary DNA (ds cDNA) of chrysanthemum stunt viroid (CSV). Cloning the cDNA into a suitable vector was attempted so that the cloned material could be used at a probe to detect CSV in chrysanthemums.

Various methods were used to purify CSV from crude extracts, the most effective being High Pressure Liquid Chromatography (HPLC). Although CSV of a high purity could be obtained this method was not suitable for purifying large amounts or screening plants for infection. This is due mainly to the time per run and the cost of the column. Ds cDNA to CSV was produced but attempts at cloning it were unsuccessful owing to the failure to ligate the ds cDNA to the vector.

A 15-mer oligonucleotide probe complementary to number 80-94 of the nucleotide sequence of CSV was synthesised. The radio-actively-labelled probe was used to detect CSV on Northern Blots of chrysanthemum leaf extracts run on polyacrylamide gels. However, the probe performed poorly on dot-blot of the same extracts.

Return-electrophoresis was used to detect CSV in leaf extracts. This method clearly identified CSV infected plants. It is a relatively cheap and quick method for screening plants for CSV infection.

GS.2433/19/5/1:

BULBOUS CUT FLOWERS: STUDY OF *UROMYCES TRANSVERSALIS* ON GLADIOLUS. 1984-1993

J.H. Ferreira

A study was made of the ultrastructure and control of *Uromyces transversalis* on gladiolus. The substomatal vesicle of *Uromyces transversalis* develops in five distinct stages after the formation of a single infection peg in the host plant *Gladiolus* spp.

The primary hyphae of the substomatal vesicle orientate at right angles (rather than at acute angles or parallel) to the stomatal slit and the parallel veins of the gladiolus leaf or to those of the non-host, *Zea mays*. The transverse orientation of *Uromyces transversalis* uredia is apparently a genetically controlled phenomenon. The two primary hyphae normally develop asynchronously on opposite sides of the substomatal vesicle, and after the formation of a haustorium mother cell, secondary hyphae branch off.

These subsequently form basal cells each of which gives rise to one or more holoblastic protuberances on its distal surface. A septum delimits the protuberance from the basal cell to form a urediospore initial,

which in turn elongates and, by septum formation, forms a pedicel and a urediospore. The urediospore is seceded mechanically through the process of schizolysis. The pedicel of a spore thus formed remains on the basal cell and becomes a collar around the next protuberance.

The basal layer of the two-layered septum, that delimited the pedicel from the basal cell, grows out to form the wall of the subsequent protuberance, in the process rupturing and laterally displacing the terminal septal layer. A new basipetal septum forms to delimit the subsequent urediospore initial. Therefore, successive urediospores are formed enteroblastically and give rise to a series of basipetal collars.

Cultivars, naturally occurring species and breeding lines of gladiolus were evaluated for rust resistance. The cultivars showed no sign of resistance, whereas the populations of wild species and breeding lines had similar resistance profiles. The species *G. daleni* and *G. tristis* var. *tristis* showed promise for breeding. Infection of these species caused an almost immune fleck reaction.

The resistance of the species *G. daleni* was manifested by the abortion of primary hyphae prior to the formation of the haustorial mother cell. The intercellular hyphae of gladiolus rust only partially adhered to the mesophyll cell of the resistant host. The haustorial apparatus that did form in the mesophyll cells in the resistance reaction was inhibited at various stages of its development.

The rust disease could be controlled chemically by either bitertanol or triadimefon. Triadimefon, however, caused a shortening of the internodes of the flower spike. The early development of *U. transversalis* infection structures in bitertanol-treated leaves was inhibited at, or shortly after, substomatal vesicle development. A number of mature substomatal vesicles with intercellular hyphae, however, did develop in the bitertanol-treated leaf tissue, probably because this fungicide undergoes limited translocation in the gladiolus lamina.

Pome and stone-fruits

APPLES

• Nutrition

VV.2441/05/1/5:

DETERMINATION OF THE LIME REQUIREMENT OF APPLE ORCHARD SOILS AND THE MOBILITY OF SURFACE-APPLIED LIME IN SOILS. 1984-1989

W.A.G. Kotze

The lime requirement of orchard soils in the Western Cape and the mobility of surface-applied lime were investigated in field trials on the Helderfontein and Drostersnes Experiment Farms as well as in laboratory studies. Estimation of lime requirements of soil samples from the Western Cape, Natal and Transvaal agreed with the general R value equation suggested by Eksteen in 1969. However, contrary to previous suggestions, the R value became negative when pH values of 5,4 or higher (in CaCl_2) are aimed for. An R value of -13 is suggested for orchard soils with an efficiency factor of 3,8. The use of the R value equation greatly improved the estimation of lime requirement as compared with an equation based on 1M KCl extractable exchange acidity.

Although a highly significant relationship existed between soil pH values determined in 1M KCl and 0,01M CaCl_2 the regression equation obtained could not be used for conversion between values because the standard error of the estimate was of the same magnitude order as the calculated difference between the two determinations. Most pH values determined in KCl were within approximately 0,3 units lower or higher than those in CaCl_2 .

Agricultural lime applied to the surface of a soil containing 8 % clay resulted in a significant increase in soil pH to a depth of 45 cm two years after application. Movement of lime as HCO_3^- , in which form neutralisation of acidity in the subsoil is possible, is suggested.

PEARS

• Physiology

VV.2442/03/2/2:

CONTROL OF VEGETATIVE GROWTH OF PEARS WITH RETARDANTS. 1984-1989

H.J. van Zyl

The growth retardant paclobutrazol (Cultar) has been evaluated over a period of three years with respect to its effect on growth control, fruit set and production of Packham's Triumph pears and Granny Smith and

Starking apples. Various concentrations and time of application had been evaluated in three different localities.

With Packham's Triumph pears shoot growth could be controlled with Cultar treatments, but without any effect on fruit set, which would be the main objective of such a treatment.

Cultar applications also had a retarding effect on both Granny Smith and Starking apple trees, but only in the year after the treatment. The effect on fruit set and production was positive in some experiments, but rather unpredictable and difficult to manage.

As a result of the negative publicity given to Alar, a similar growth retardant which was used extensively in the U.S.A., it was decided to terminate the experimental work on Cultar and not to give it anymore publicity.

PEACHES

• *Physiology*

VV.2443/03/4/4:

FACTORS WHICH CAUSE PIT BURN AND INTERNAL BREAKDOWN IN PEACHES.
1985-1989

W.A.G. Kotze

Initially field observations of the disorder was made when canners reported high incidence during processing. Indications were that fruit from Kakamas trees on sandy soils were especially prone to the disorder. However, incidence of pit burn varied greatly from season to season and it appeared likely that climatic factors were also involved in its initiation. Extremely high temperatures are quite common in the Western Cape during the period from mid-January to end-February, the period just before Kakamas-peaches are harvested, and could result in fruit damage by high temperature and/or water stress.

Field trials were carried out during the 1987/88 and 1988/89 seasons in existing Kakamas peach orchards on Bien Donne to determine the effects of picking maturity, cold storage and irrigation on the incidence of pit burn. During both seasons extremely hot weather was experienced during the two to three weeks prior to harvest. Both picking maturity and cold storage as well as the interaction between these factors had a highly significant effect on the incidence of pit burn. Cold storage greatly aggravated the incidence of the disorder if fruit were picked at or after optimum maturity. When high temperatures are experienced before and during the harvest of Kakamas peaches, care must be taken to ensure that fruit is picked at the correct maturity. Fruit harvested under such conditions must be processed immediately.

Irrigation had a very high significant effect on the incidence of pit burn and resulted in 28 % occurrence of the disorder compared with 84 % in the unirrigated control. Although the former figure is still unacceptable high, indications are that correct irrigation scheduling during the period before harvest can do much to alleviate the problem.

• *Nutrition*

VV.2443/05/1/3:

PRACTICAL MANIPULATIONS TO INCREASE THE UREASE ACTIVITY OF SANDY SOILS
IN PEACH ORCHARDS. 1985-1989

M.E. Joubert

The effects of lime and organic matter (100 m³ ha⁻¹ as straw or compost) applied during soil preparation on the utilisation of urea by Nectared-9 nectarine trees on seedling rootstock were investigated on a sandy soil on the Citrusdal Experiment Farm. Limestone ammonium nitrate (LAN) was used as control. Increase in trunk circumference indicated that although liming resulted in improved tree growth, the interaction between liming and N source was not significant.

In 1986 pruning mass indicated a larger response from liming of trees which had received LAN. Urease activity in the soil was significantly increased by liming. However, the increase was too small to be of any practical importance and in all cases less than 10 % of the applied urea was hydrolysed during a 25 h incubation period.

Application of organic matter improved tree growth significantly but did not result in improved utilisation of urea. Urease activity was also not affected by application of organic matter. The highest in situ organic matter content and also urease activity is usually found in the top soil. In sandy soils with their low water holding capacity, irrigation will have to be scheduled very well to prevent leaching before it is hydrolysed to plant available forms. This is not easily managed in practice and therefore the use of urea is not recommended on sandy soils.

Viticulture

WINE GRAPES

- *Pests*

WW.2462/20/1/5:

BIOLOGY OF ROOT-KNOT NEMATODES. 1982 - 1989
J.T. Loubser

The investigation has shown to which degree *Meloidogyne* spp. are distributed in South African vineyards. It was shown that *M. javanica* constitutes 73,2% of all populations, *M. arenaria* 17,0%, *M. incognita* 7,1% and *M. hapla* 2,7%. The relative importance of each species was determined and it was shown that all species can attack grapevine rootstocks. Pathogenicity was shown to increase with temperature whereas resistance declined.

The seasonal occurrence of two species in two climatically different regions was studied as well as their distribution in the soil. Most nematodes were found in the top 600 mm of soil and within 600 mm of the vine trunk. An increase in nematode reproduction was measured at onset of root growth during spring and after harvest, but because larvae penetrated newly formed roots, higher soil populations were not always recorded. Soil populations were high during winter when new root growth occurred and were low during summer.

Grapevine rootstock cultivars were successfully cultured on more than one artificial medium and *Meloidogyne javanica* could be cultured in vitro. Reproduction was only recorded on susceptible rootstocks, indicating that in vitro reaction to nematodes was similar to that under natural conditions.

Citrus and subtropical crops

OTHER SUBTROPICAL CROPS

- *Technology*

SS.2486/52/2/1:

POST-HARVEST HANDLING OF OTHER SUBTROPICAL CROPS: GINGER. 1986-1989
D.H. Swarts

Over a period of 3 years different storage temperatures, wax treatments and post-harvest fungicide dips were evaluated on fresh ginger under simulated sea shipment conditions. Fungal colonisation on these rhizomes was also investigated.

The findings indicated that the traditional hot fungicide dip (as for most subtropical fruits) could not be used on this heat-sensitive crop. Cold dips performed better. It was also found that the ginger sprouted during storage at temperatures above 15 to 20 °C, whereas decay and mould growth prevailed at too low storage temperatures.

The best results were obtained at a storage temperature of 10 °C with ginger which had been dipped in a fungicide suspension containing 0,8 g/l (a.i.) prochloraz. Waxing could not reduce mass loss to the same extent as did a plastic bag. *Fusarium* and *Alternaria* were the most common fungi to be isolated from the ginger.

PLANT PROTECTION RESEARCH

Entomology/Zoology

INSECTS

- *Pests*

PB.2511/20/1/3:

ASPECTS OF REPRODUCTION OF *LOCUSTA MIGRATORIA MIGRATORIOIDES* IN RELATION TO AGEING AND AVAILABLE FOOD. 1988-1989
H.D. Brown

This study was undertaken as contract research by Dr S.A. Hanrahan, Department of Zoology, University of the Witwatersrand, Johannesburg.

The African migratory locust, *Locusta migratoria migratorioides*, was once relatively rare in the Orange Free State and Transvaal. However, in recent years it has become an important pest of crops in the summer rainfall region. This study was carried out to establish whether the locust obtained enough food to build up its fat reserves, a prerequisite for egg production. In laboratory and field trials a method was developed for accurately estimating the age of adult locusts, and the development of the fat body under different temperatures and at low temperatures with specific food types was studied.

Under winter conditions, the cuticular layers of adult locusts were deposited on a regular daily basis but were reduced in thickness with the lower temperatures. Using thin stained tibia sections, it was found that the ages of adult locusts could be estimated up to 30 days. The ages of field-reared locusts were accurately estimated for up to 36 days into the post-fledging period.

Using a "wet diet" of fresh green maize, wheat and grass and a "dry diet" of dried maize, bran and an occasional supplement of green food, the "dry diet" caused a high mortality when the locusts were subjected to low temperatures. Nevertheless, those locusts that survived slowly accumulated fat deposits. Egg production, although correlated with lipid deposition, also appeared to have a seasonal trigger because those locusts alive at the end of winter all started to produce larger eggs, irrespective of age.

This study has shown that adults of the African migratory locust can survive very low winter temperatures and the regular absence of green food. Under these conditions, the locusts continue to accumulate fat and are ready to lay their eggs at the beginning of spring. The contribution of this winter generation of adults to overall population numbers may be an important aspect in the outbreak of locust swarms.

PB.2511/20/2/2:

BAT-EARED FOXES, *OTOCYON MEGALOTIS*, AS CONSUMERS OF HARVESTER TERMITES (*HODOTERMES MOSSAMBICUS*). 1988-1989

F.D. Duncan

This study was undertaken as contract research by Prof. J.A.J. Nel and Mr A.J. Mackie, Department of Zoology, Stellenbosch University.

The effect of bat-eared foxes on harvester termites in the Orange Free State was studied on Tussen-die-Riviere Game Farm near Bethulie. Research confirmed that bat-eared foxes are one of the main predators of *H. mossambicus* in South Africa, consuming approximately $1,15 \times 10^6$ termites/fox/year. In their preferred short grassveld habitat, with a mean home range of 1,05 km² and an average of 3,7 foxes per group, bat-eared foxes consume about 40 500 termites/ha/year. This data suggests that the importance of bat-eared foxes is not in reducing termite populations during a "population explosion" but in regulating termite populations before peak numbers occur.

Faecal analyses showed that termites occur in more than 50 % of bat-eared fox droppings and that the foxes' feeding behaviour is specifically associated with this insect. Bat-eared foxes have successfully adopted a specific foraging strategy for utilising harvester termites when they are abundant and foraging opportunistically when termites are absent. Because it is not known what factors limit bat-eared fox populations, it does appear that food availability is of major importance and that high densities of foxes can occur given an adequate food supply.

Bat-eared foxes appear to feed more extensively on harvester termites in the Orange Free State than in the Karoo and this may be due to a wider spectrum of food in the Karoo. The consumption of termites on a Karoo stock-farm area was higher than in an adjacent conservation area (Karoo National Park) and this was associated with nearly three times more termite colonies in the heavily grazed area than in the Park.

Plant pathology/Microbiology

FUNGI

• Taxonomy

PB.2521/01/1/4:

TAXONOMY OF FUNGI: *COELOMYCETES* OF SOUTH AFRICA. 1982-1989

C. Roux

The Coelomycetes from South Africa were identified and various new records established. A new mode of conidiogenesis was described by means of optical and electron microscopy. The term thysanoblastic conidiogenesis was proposed to describe this new conidiogenesis.

Several anomalies in descriptions of conidiogenesis in the Coelomycetes have been explained. The systematic arrangement of some of the Coelomycetes as proposed by B.C. Sutton has been confirmed by results obtained under this facet.

PB.2521/01/1/6:

TAXONOMY OF FUNGI: *FUSARIUM* SPECIES IN SOUTH AFRICA. 1984-1989
E.J. van der Linde

An extensive survey on the *Fusarium* species occurring in South Africa was done in co-operation with Dr L.W. Burgess (University of Sydney, Australia), Dr W.F.. Marassas (NNIVS) and Dr S.C. Lamprecht (PPRI). More than 3 000 isolates were made from nearly 40 localities of different climatic and vegetative regions. Various new species varieties were found and 7 unknown populations were isolated. More than 22 species of *Fusarium* were isolated in total. The taxonomy, morphology and distribution of these species were studied. The results of this study is of great significance nationally, as well as internationally and will be useful to both taxonomists and researchers.

The other study concerning *Fusarium* species parasitic on scale insects was also completed. *Fusarium coccophilum* and its teliomorph *Nectria flammea* were collected at 6 different localities and *F. coccidicola* at one locality. The study included the taxonomy, morphology and distribution of these two entomophagous species.

• Pathology

PB.2521/19/7/1:

SEEDBORNE FUNGAL PATHOGENES AND DISEASE TRANSMISSION BY SEED OF
MEDICAGO SPP. 1986-1989
S.C. Lamprecht

The incidence of *Fusarium* spp. on seeds and seedpods of annual *Medicago* spp. (medics), collected during the 1985, 1986 and 1987 growing seasons from a medic field in Swellendam, was determined. *Fusarium acuminatum*, *F. avenaceum*, *F. dimerum*, *F. equiseti*, *F. graminearum* Gr. 1, *F. oxysporum*, *F. reticulatum*, *F. sambucinum*, *F. scirpi* and *F. tricinctum* were isolated from both seeds and seedpods, whereas *F. polyphialidicum* and *F. solani* were recorded from seedpods only.

F. acuminatum was the *Fusarium* species most frequently isolated from medic seeds and pods. Differences in frequencies of isolation of *Fusarium* spp. from seeds and seedpods occurred at the different sampling dates. The highest incidence of *F. avenaceum* recorded on seed was 23,2 % compared with 29,5 % on seedpods. The incidence of *F. avenaceum* was higher at the beginning of the growing season than at the end. These results indicate the importance of infected medic seeds and pods as source of *F. avenaceum* inoculum at the beginning of the growing season.

The effect of medic seed pods infected with *F. avenaceum* on subsequent survival and root rot of plants was studied. Seedpods artificially inoculated with *F. avenaceum* caused damping-off of seedlings, reduced the survival of plants and caused root rot under glasshouse conditions. *F. avenaceum* can, therefore, be transmitted from infected seedpods to medic seedlings.

The potential danger to grazing sheep of six toxigenic *Fusarium* spp. associated with medic seeds and seedpods in South Africa was assessed. At least three of these, *F. acuminatum*, *F. avenaceum* and *F. reticulatum* were acutely toxic to sheep. Moniliformin, the main mycotoxin produced by these species, was also acutely toxic. Moniliformin has, however, not been reported to occur naturally in medic seeds or seedpods and no field outbreaks of mycotoxicosis in animals grazing medic seedpods have been recorded.

PB.2521/19/7/2:

SURVIVAL AND INFECTION OF *FUSARIUM AVENACEUM* ON ANNUAL *MEDICAGO*
SPP. 1986-1989
S.C. Lamprecht

The oversummering (survival during the dry summer months) of *Fusarium avenaceum* in artificially inoculated roots, stems, seedpods and seeds of *Medicago truncatula* cv. Jemalong (medic) was studied at Langgewens (Western Cape) and Swellendam (Southern Cape).

The incidence of the fungus on medic plant material was determined initially and after 1, 2 and 4 months. The changes in incidence of *F. avenaceum* on plant material at the two localities did not differ

significantly. The incidence of the fungus decreased on stems, seeds and seedpods after the first month in the field, but increased significantly afterwards, whereas, in the roots it decreased significantly with time.

Aboveground medic material might therefore be an important source of *F. avenaceum* inoculum.

BACTERIA

• Nitrogen fixation

PB.2522/09/1/18:

BACTERIA: COMPETITION STUDIES WITH ROOT NODULE BACTERIA: COMPARISON OF A STRAIN OF *BRADYRHIZOBIUM* SP. (*LOTUS*) FROM ESTABLISHED SOIL POPULATIONS AND LABORATORY CULTURES. 1986-1988

H.H. Lochner

A challenging problem which hampers legume cultivation in many areas is the high failure rate in introducing more desirable strains of nodule bacteria into soils with established rhizobial populations capable of nodulating the legume(s) concerned. One of the basic questions concerning this complicated phenomenon was addressed in the study, namely, whether cells of a strain of rhizobia gain enhanced capability to compete for nodulation after extended periods in the soil.

A *Bradyrhizobium* sp. (*Lotus*) strain which formed a highly competitive soil population 11 years after its introduction into a field soil and a culture of the same strain, stored lyophilized, were compared with an antibiotic resistant mutant in respect of nodulation competitiveness. The mutant was less competitive than the wild type strain it was isolated from and had to be present at a cell ration of 5,76:1 in mixed inoculum to form 50% of the nodules on *Lotus pendunculatus* (N_{50} value = 5,76). N_{50} values for the mutant in combination with the lyophilized and soil strain were, respectively, 6,83 and 5,77, indicating that the strain from soil was not significantly different from the lyophilized strain in nodulation competitiveness.

A N_{50} value of 11,18 obtained when the field soil was mixed with soil containing a known number of cells of a recently established mutant population, indicated that the plant infection technique underestimated cell number of the field soil population by 100%. Nodulation competitiveness was unaffected by the size of the strain populations in the range 100-1 000 cells/g soil; at 10 cells/g a significant correlation between strain ratios in nodules and in soil was still evident.

The results indicated that apparently superior nodulation competitiveness of a well established soil population relative to that of subsequently introduced strain may not necessarily reflect the intrinsic competitive abilities of the strain(s) involved. The soil strain did not differ from laboratory maintained cultures in antigenic properties, effectiveness and whole cell protein electrophoresis profiles.

• Pathology

PB.2522/19/1/5:

BACTERIAL DISEASES OF AGRICULTURAL CROPS: IDENTIFICATION AND ELIMINATION OF BACTERIAL PATHOGENS IN GUAR. 1984-1989

C.C. Deschodt

Guar gum derived from *Cyamopsis tetragonaloba* is of strategic importance to the mining industry in the R.S.A. An attempt is being made to grow suitable cultivars by smallholder black farmers in the homelands.

Bacterial blight caused by *Xanthomonas campestris cyamopsidis* is a seed-borne disease of guar and a continuous threat to its cultivation when conditions are favourable for development of the disease.

A species of *Erwinia* and *Alternaria alternata* are also seed-borne and cause heavy crop losses. Both *Xanthomonas cyamopsidis* and the species of *Erwinia* was repeatedly isolated from plant material and seed being tested. The bacteria were identified according to standard bacteriological techniques. Koch's postulates were successfully applied and the hypersensitive test on tobacco was positive. Most seed-born pathogens of guar are eliminated to a great extent by treating the seed with hot water at 56 °C for 10 minutes. Treated seed has to be dried in the shade, however, and cannot be stored. As warm water heat treatment of the seed is impractical for the black smallholder farmer, it is important to develop a method for the production of pathogen-free seed which can be stored for a prolonged period and will have high germination.

Seed treated with zinc and copper omadine were compared with seed treated with hot water or thialin for their ability to eradicate seed-borne pathogens in laboratory and field tests. The most promising seeddressing was copper omadine but it did not yield disease free-seed.

Treatment of seed with crude mais oil at several high temperatures for different period of time had promising results in the laboratory. Even temperatures of 70 °C-75 °C for 30 min. did not affect seed germination.

In field experiments, however, plots grown from seed treated with mais oil at 70-75 °C for 30 min. were quickly contaminated from control plants thus affecting their yield at harvest. Further yield tests are required.

VIRUSES

• Virology

PB.2523/12/1/1:

FUNDAMENTAL RESEARCH ON THE AETIOLOGY OF THE GRAPEVINE LEAFROLL DISEASE COMPLEX. 1985-1989

D.J. Engelbrecht

The virus aetiology of graft-transmissible grapevine leafroll (GLR) disease, occurring widespread in South African vineyards, was investigated. Antisera produced to viruses purified from local GLR disease sources and antisera to GLR isolates obtained from abroad were used to screen local grapevines. Commercial, naturally and mealybug (*Planococcus ficus*)-infected sources by direct and indirect enzyme-linked immunosorbent assays and immunosorbent electron microscopy with antibody coating, were included. At least four closteroviruses were detected in local grapevine sources. They include grapevine virus A(GVA), GLR associated closterovirus (associate CV.) Type I, GLR associate CV. Type II and GLR associate CV. Type III.

The latter virus was the most widespread in naturally and mealybug infected vines where it produced very mild to classic GLR disease symptoms in the indicators LN-33, Cabernet franc and Gamay. GLR associate CV Type III was also found associated with grapevine corky bark disease and grapevine Shiraz disease suggesting the presence of biological strains of this virus.

Dual infection of GLR associate CV Type III with GLR associate CV Type II, which was found widespread in initially virus-free Barlinka vines, produced a stronger GLR disease reaction than when only GLR associate CV. Type III was present. This synergic effect was also evident with the additional presence of GLR associate CV Type I in commercial Barlinka vines with GLR disease symptoms more pronounced.

Although widespread GVA was always found in the presence of either GLR associate CV. Type II or GLR associate CV. Type III but did not appear to contribute to disease expression. GLR associate CV. Type I was only detected in commercially grafted vines where it was most frequently present with two or more of the closteroviruses. Such vines of all locally grown wine and table grape cultivars showed typical GLR disease symptoms in contrast to vines without detectable closteroviruses which retained their normal green coloured leaves until leaf drop.

A spherical virus-like particle found widespread in local grapevine sources appeared not to be associated with the GLR disease complex.

PB.2523/12/1/2:

FUNDAMENTAL RESEARCH ON THE MODE OF SPREAD OF VIRUSES IN THE GRAPEVINE LEAFROLL DISEASE COMPLEX. 1985-1989

D.J. Engelbrecht

The mode of natural spread of viruses associated with grapevine leafroll (GLR) disease and transmission by the vine mealybug, *Planococcus ficus* were investigated with locally produced antisera to closteroviruses purified from vines showing GLR disease and antisera produced to viruses isolated from GLR-diseased vines abroad.

Screening of local grapevine sources was by direct and indirect enzyme-linked immunosorbent assays and immunosorbent electron microscopy with antibody coating. Patterns of natural and mealybug transmission of GVA and GLR associated closterovirus (associate CV) Type III were similar with GVA dependant on GLR associate CV Type III for transmission. Similar results were obtained with transmission of GVA from grapevine to *Nicotiana clevelandii* by *P. ficus*.

Although GLR associate CV. Type II was not transmitted by *P. ficus* in limited tests and not between Waltham Cross vines growing in close proximity for a decade in the presence of a low population of *P. ficus* it was found to spread naturally in association with GLR associate CV Type III into virus-free Barlinka in the Hex River Valley. No evidence of natural spread of GLR associate CV Type I into virus-free vines in the presence of a virus reservoir (commercial vines) and mealybug could be found.

Failure to infect test vines following an aquisition access period of 2 weeks on a virus source may be explained by the apparent inability of the mealybug to acquire the virus. Grapevine corky bark and the

grapevine Shiraz disease, found to be associated with GLR associate CV Type III, spread naturally albeit at a low level.

PB.2523. 12/1/6:

DETECTION AND IDENTIFICATION OF SEED-TRANSMITTED VIRUSES IN LUPINS.
1985-1989

P.M.B. Snyman

Owing to two personnel changes and the necessity of training people in this field relatively little research was done on this facet. Bean yellow mosaic virus (BYMV) and cucumber mosaic virus (CMV) were found to infect this crop fairly commonly.

An ELISA detection system was developed for the routine detection of CMV. Soybean mosaic virus (SoyMV) was also detected on this crop, and seed-transmission of this virus on lupin was demonstrated for the first time. A number of properties of the SoyMV isolate were determined.

PB.2523/12/1/7:

DETECTION AND IDENTIFICATION OF SEED-TRANSMITTED VIRUS IN *PHASEOLUS VULGARIS* L. 1986-1989

M.J. Koch

The purpose of the work was to isolate viruses prevalent on field beans in South Africa, to identify and characterise them, to develop techniques to detect them, and to determine whether they are seed-transmitted in this crop.

Four viruses were isolated and identified to be BCMV, BYMV, PeMotV, and CMV. A number of properties of these isolates were determined.

Weed research

WEEDS

• Chemical control

PB.2551/21/1/2:

CHEMICAL CONTROL OF THE WEED *STIPA TRICHOTOMA* (NEES). 1980-1988

B.D. Viljoen

Nassella tussock (*Stipa trichotoma* Nees), a native of South America, has infested large areas in Australia, New Zealand and the Republic of South Africa. The plant has been declared a noxious weed locally because its spread poses a serious threat to 44 million hectares of the best veld and pastures in the eastern and southern highlands of the country unless effective control measures are implemented.

Initial research with proprop (2,2-dichloropropionic acid) at 34 kg a.i. ha⁻¹ and glyphosate (isopropylamine salt of glyphosate) at 2,87 kg a.i. ha⁻¹ applied during summer proved to be effective. However, the regeneration of seedlings was rapid, resulting in repeated applications to maintain total weed control. This action was impractical and uneconomical.

The object of this investigation was firstly to substantiate the efficiency of tetrapion (2,2,3,3-tetrafluoropropionic acid) under natural conditions and to determine its effect on valuable non-target grass species and their seedlings that are sympatric with the weed. Secondly, a trial was conducted under artificial conditions to screen a legume and three grasses for their sensitivity to tetrapion.

Experiments conducted in the Cathcart and Somerset East districts showed that tetrapion is effective at different rates when applied to mature nassella tussock stands. Initial research carried out in the Cathcart district resulted in the registration of tetrapion at 1,76 kg a.i. ha⁻¹. As a result of further investigations in the Somerset East district the recommended rate was reduced to 0,88 kg a.i. ha⁻¹ with no significant decrease in efficacy. This rate was considerably less phytotoxic to valuable indigenous grasses such as *Themeda triandra* Forssk. (Red grass) and *Andropogon appendiculatus* Nees (Blue grass).

The 0,88 kg a.i. ha⁻¹ rate also showed no effect on the re-establishment of seedlings of both grass species in comparison with nassella tussock where a mortality of 100% was obtained 18 months after treatment. Screening trials conducted at Uitenhage revealed that at a rate of 0,88 kg a.i. ha⁻¹ *Vicia villosa* L. was not susceptible, whereas *L. Dactylis glomerata* was moderately and *Eragrostis curvula* Nees severely affected.

These findings have an important bearing on the nassella tussock campaign in South Africa:

- (i) Applying tetrapion at the reduced rate of 0,88 kg a.i. ha⁻¹ is more cost-effective and allows quicker veld recovery after spraying.

- (ii) Tetrapion proved to be effective throughout the year, mixes easily with water and is cheaper than proprop or glyphosate.
- (iii) Valuable non-target species such as *T. triandra* and *A. appendiculatus* are slightly affected.
- (iv) Regular follow-up and oversowing of treated areas with non-sensitive pasture species is essential for effective long-term control of nassella tussock. The need for further screening and research is stressed.

• *Biological control*

PB.2551/22/1/1:

THE BIOLOGICAL CONTROL OF THE WEED JOINTED CACTUS *PUNTIA AURANTIACA*.
1981-1988

H.G. Zimmermann

An attempt was made to improve the existing level of biological control of jointed cactus by introducing new natural insect enemies from South America and to find methods to enhance the performance of the cochineal *Dactylopius austrinus*.

Five insect species were introduced and released from the Americas for the biological control of jointed cactus in South Africa. Of these, only two have established and only one, namely the cochineal *D. austrinus*, is having a significant effect on jointed cactus infestations. Research indicated that the exceptionally high mortalities of the egg-stages of the phycitid moths that lay single eggs, was the main cause why they did not establish. Egg survival of the gregarious feeder, *Cactoblastis cactorum*, which oviposits in the form of an egg stick, was highest and explains why this is the only phycitid moth that could establish. Ant predation was the main cause of the high egg mortality.

Detailed ecological research on both the cochineal, *D. austrinus*, and its host *O. aurantiaca* showed that cochineal populations are selectively eliminated by current chemical spraying techniques which is detrimental to biological control. To overcome this, a modified spraying technique was devised that would not only bring about considerable savings, but would also be less harmful to the biological control agents.

In the absence of any insect enemies, jointed cactus has a phenomenally high growth rate. In the presence of *D. austrinus* however, natural jointed cactus populations normally stabilise at an equilibrium level of 400 - 700 cladodes per 15 m² with typical 5 - 7 year long cycles. The amplitude and length of the population cycle can be manipulated by artificially increasing the cochineal inoculum at the upswing of the cycle.

On the basis of these findings a modified control strategy against jointed cactus was devised that would allow maximum benefit from biological, chemical and mechanical control. The following points were considered:

1. An adequate cochineal inoculum must be present in all jointed cactus infestations.
2. Chemical control should never be used for the control of dense infestations because it is time and money wasted. Instead, they should be reserved for *D. austrinus* which is particularly effective at high jointed cactus population levels. If necessary, chemical control can be used as a follow-up treatment.
3. Chemical control should preferably be aimed at medium to large jointed cactus plants during a post-biocontrol phase of the cycle because of the high searching efficiency of sprayers locating large plants and because treating small plants increases wastage. Alternatively small plants and isolated cladodes can be hand-collected at low infestations and then treated collectively in heaps.

PB.2551/22/1/7:

BIOLOGICAL CONTROL OF THE WEED *HYPERICUM PERFORATUM*. 1972-1989

J.A. Gordon

The biological control of St. John's wort, *Hypericum perforatum* L., was first initiated in 1959 with the introduction of the leaf-feeding beetle *Crysolina quadrigemina* from Australia. Although the beetles reduced the dense stands of St. John's wort the weed still persisted and the biological control programme was revived in 1972.

Because of the limited natural dispersal capacity of *C. quadrigemina* beetles were periodically redistributed to new infestations of the weed. The efficacy of *C. quadrigemina* was studied over a ten-year period at Tulbagh. The mean plant density, which was 23,2 plants/m² at the start of the trial, fluctuated widely owing to larval attack during the winter but stabilised at between 14,78 and 18,08 plants/m² over the last four years of the study period.

The gall midge, *Zeudidiplosis giardi* was introduced from Australia in 1972 to supplement the work done by *C. quadrigemina*. The gall midge established and dispersed readily in most of the areas where it was

released. A chemical exclusion trial done in the field showed that *Z. giardi* suppressed plant growth. Seedling survival was reduced by 15 % and flowering was prevented in the first year. A study of the seasonal history of *Z. giardi* in South Africa showed that it has five or six generations per annum.

During the study the percentage of growth tips and buds infested by *Z. giardi* varied from 35,1 - 67,2 % and the percentage parasitism from 0,4 - 11,8 %.

Various shipments of the root borer *Agilus hyperici* were received from Australia and California. Adults released in gauze cages on St. John's wort plants in the field laid eggs. No recoveries were made, however, as the plants died as a result of *C. quadrigemina* damage.

Eggs of the looper, *Anaitus efformata*, received from Australia were infected with a virus which meant the larvae had to be reared individually for two generations. Adults were released in a walk-in cage and although eggs were laid the colony eventually died out as a result of predation.

Adults and nymphs of *Aphis chloris* were imported from Canada and large numbers reared and released at three sites. Although *A. chloris* multiplied in the field, eggs laid in winter failed to hatch. Climatic conditions in the south-western Cape do not appear to suit this insect.

The two biological control agents, *C. quadrigemina* and *Z. giardi* have successfully reduced and prevented the spread of St. John's wort.

● Ecology

PB.2551/27/1/1:

ECOLOGY OF THE WEED *ACACIA LONGIFOLIA*. 1982-1988
P.J. Pieterse

An ecological study of the weed *Acacia longifolia* was undertaken to obtain information on its ecology and population dynamics. This information could be used in the development of feasible control and management programmes.

Aspects that were investigated, included seed dormancy and germination; establishment, growth and mortality of seedlings; reproductive performance; seed bank sizes; survival of seeds on and under the soil surface and the effect of fire of the seed bank.

The water permeability of *A. longifolia* seed can be increased by mechanical scarification, acid scarification, treatment with organic solvents and wet and dry heat. This implies that exposure to fire and possibly direct sunlight will enhance the germination of the seed. Light quality and quantity did not affect germination and optimum germination temperature was 20 °C.

The growth rate of *A. longifolia* seedlings that established after a fire was highest during spring and early summer and this would probably be the best time for herbicide application. Seedlings establishing after a fire had low mortality whereas seedlings establishing under the parent canopy had a high mortality. Therefore, a possible method of inhibiting the establishment of numerous seedlings after a fire is the establishment of a fast growing smother crop immediately after the fire.

A. longifolia plants produced flowers two years after germination but seed production was observed only in the third growing season. A comparison of reproductive performance in South Africa with reproductive performance in Australia indicated that lack of predators is the major factor contributing to the success in seed production of *A. longifolia* in South Africa.

Seed densities in seed banks ranged between 1 347 and 27 912 seeds per square meter although it was found that birds, rodents and ants can remove between 60 - 100 % of exposed seeds after one week in the field.

Circa 10 % of seed buried at different depths for one year disappeared during the study period - mainly owing to germination but fire destroyed between 79,2 and 92 % of the seed bank in three different localities. Fire should, therefore, form part of integrated control programmes if seed bank depletion is one of the control objectives.

ANIMAL PRODUCTION PROMOTION

ANIMAL PRODUCTION AND ANIMAL PRODUCTS RESEARCH

Animal production

PIGS

• Nutrition

VS.3119/05/1/11:

PIG NUTRITION: QUANTIFICATION OF THE VARIATION IN DIGESTIBLE ENERGY CONTENT OF SORGHUM BY MEANS OF THE MOBILE NYLON BAG TECHNIQUE.
1987-1989

T.S. Brand

An experiment was conducted to:

1. Compare the chemical and physical composition of twenty different grain sorghum cultivars from three different locations in South Africa (two from dry land and one from irrigated land).
2. Evaluate the effect of seed size, unthreshed grain and impurities on the chemical composition and physical characteristics of the grain.

The crude protein (CP) content of the different cultivars varied between 10,4 and 13,1 % with a mean value of $11,4 \pm 0,7$. Crude fibre (CF) content varied between 2,23 and 3,04 % with a mean value of $2,58 \pm 0,25$. Starch content of GH (high tannin) cultivars ($66,9 \pm 1,0$) were in all cases lower than the starch content of the GL (low tannin) cultivars ($73,3 \pm 1,6$), and was highly significantly ($P > 0,01$) influenced by tannin content ($r = -0,64$). Highly significant ($P < 0,01$) differences in CP, CF, tannin and starch content, as well as in hectoliter and thousand seed mass, were observed between sorghum produced on different localities.

There appeared to be no significant differences in chemical composition of samples with different amounts of unthreshed grain (up to 16 %) or with different seed sizes (< 2 mm, 2-2,5 mm and 2,5-3 mm). Significant ($P < 0,01$) correlations were found between hectoliter mass, unthreshed grain ($-0,83$) and seed size ($0,55$), and also between seed size and 1000 seed mass ($0,98$). Combined samples containing different amounts of unthreshed grain, small seeds (< 2 mm) and impurities, had a highly significant ($P < 0,01$) influence on hectoliter mass. Impurities had a significant ($P < 0,05$) influence on CF ($r = 0,36$) and starch content ($r = 0,45$), whereas unthreshed grain had a highly significant ($P < 0,01$) influence on CP content ($r = -0,68$) and a significant ($P < 0,05$) influence on CF content ($r = 0,39$). It was concluded that observed differences may cause the variation in the nutritive value and the contradictory results achieved in practice with sorghum grain.

A second experiment was therefore conducted to:

1. Compare the digestible energy (DE) content of different grain sorghum cultivars and grain sorghum produced at two different locations.
2. Evaluate the influence of chemical composition and physical characteristics of the grain on the DE content thereof.

Significant ($P < 0,01$) differences occurred between the DE content of different grain sorghum cultivars as well as between cultivars produced at different locations, whereas significant ($P < 0,01$) interactions were found between location and cultivar.

The mean DE content for low-tannin (GL) sorghum cultivars was $16,1 \pm 0,6$ MJ/kg DM, whereas the corresponding value for high-tannin (GH) sorghum cultivars was $14,1 \pm 0,6$ MJ/kg DM. The mean DE contents for GL cultivars were, respectively, $16,7 \pm 1,2$ and $16,1 \pm 1,2$ MJ/kg DM for Bethlehem and Ermelo, whereas the DE content for GH cultivars were $15,0 \pm 0,9$ and $13,5 \pm 1,9$ MJ/kg DM.

Concerning the influence of physical parameters on DE, it was found that the percentage small seeds (< 2 mm) and percentage unthreshed grain had a negative influence on DE content. Tannin content had a negative effect on DE (significant at $P < 0,01$), whereas starch and protein content had a positive influence

on DE (significant at $P < 0,01$). The following regression equations were found feasible to predict DE (r - square values, however, were low):

DE content (MJ/kg DM) = $5,50 - 1,385 (\text{tannin } \%) + 0,105 (\text{starch } \%) + 0,317 (\text{protein } \%)$ ($r^2 = 0,30$)

DE content (MJ/kg DM) = $16,51 - 1,479 (\text{tannin } \%)$ ($r^2 = 0,58$)

DE content (MJ/kg DM) = $0,968 + 0,210 (\text{starch } \%)$ ($r^2 = 0,34$)

DE content (MJ/kg DM) = $16,80 - 0,058 (\% \text{ unthreshed grain}) - 0,036 (\% \text{ seeds smaller than 2 mm}) - 0,021 (\% \text{ impurities})$ ($r^2 = 0,22$)

DE content (MJ/kg DM) = $17,16 - 0,637 (\text{grading})$ ($r^2 = 0,18$)

From this study it was concluded that differences in DE content occurred between individual GL and GH sorghum cultivars. Grain produced at different locations also differed from each other in DE content. It seemed that some of the variation in DE might be ascribed to the variation in chemical composition as well as the physical characteristics of the grain. In agreement with other researchers, it was also difficult to get useful relationships between the chemical composition and DE content of sorghum. From this study it could be concluded that the present South African grain sorghum system pointed out the differences in the DE content in terms of the amounts of unthreshed grain and small seeds. The mobile nylon bag technique was found to be a useful technique to evaluate different sorghum samples in terms of their DE content, although, slightly high DM digestibilities with accompanied high DE values were found in a few cases.

A third experiment was conducted to evaluate a hetero-yellow endosperm sorghum cultivar (G766W) in comparison to a low-tannin (GL)-sorghum cultivar and maize in a growth trial with pigs. The digestible energy (DE) content of the grain components and experimental diets was determined by means of the mobile nylon bag technique (MNBT), whereas the chemical and amino acid composition were determined by chemical analysis.

There were no significant differences between the DE contents of the maize (16,1 MJ/kg DM), GL sorghum (16,6 MJ/kg DM) or G766W sorghum (16,0 MJ/kg DM) or the experimental diets (respectively, 15,1, 15,2 and 15,3 MJ/kg DM). The CP content (DM basis) of the diets varied from 19,9 % for the maize diet to 20,6 % for G766W sorghum diet and 21,2 % for GL sorghum diet, but were almost equal in lysine (0,91, 0,96 and 0,91 %) and methionine plus cystine content (0,66, 0,61 and 0,58 %). There were no significant differences in average daily gain and feed conversion ratio of pigs fed either maize, GL sorghum or G766W as the grain component in a balanced diet.

It was, therefore, concluded that if low-tannin grain sorghum of a good quality is used and the diet is composed to meet the recommended dietary levels, optimal pig performance is possible.

Animal products

MEAT

• Norm studies

VS.3121/50/1/12:

PORK PRODUCTION AND MEAT NORM STUDIES: THE FEASIBILITY OF USING CAUDAL FAT FROM FAT-TAILED SHEEP CARCASSES TO SUBSTITUTE FOR PORK FAT IN EMULSIFIED MEAT PRODUCTS. 1987-1988

G.L. Nortjé

The aim of the research was to determine the influence of the substitution of pork fat with caudal fat on the sensory quality characteristics of two emulsion products and to identify acceptable combinations of pork fat and caudal fat for manufacturing purposes.

Fat from the A, B and C age carcasses were used. A standard recipe was used for the production of the products, whereas the sheep:pork fat ratio was varied. Substitution percentages of 0 %, 25 %, 50 %, 75 % and 100 % of sheep fat were used.

No emulsion stability problems were encountered, but the level of substitution of sheep fat definitely had an influence on the sensory quality characteristics of the vienna sausages, since for all the factors the 0 % substitution level was preferred and even the lowest level of inclusion was detected and found to be less desirable. Texture was the only exception, where 50 % substitution was preferred. As a 25 % substitution was too high, any level between 25-100 % could not be recommended, but substitution levels from 0-25 %, using smaller intervals, should be investigated before the use of caudal sheep fat is completely disregarded as a substitute for pork fat in viennas.

Results further showed that the A and C age fats were preferred, and that a 25-50 % supplementation would be acceptable in a product like polony which is usually consumed cold.

Supporting animal research

ANIMALS

• Nutrition

VS.3133/05/3/17:

DIGESTIVE PHYSIOLOGY AND METABOLISM ASPECTS IN THE FEEDING OF FARM ANIMALS: AMMONIA TRANSPORT AND ITS INFLUENCE ON NITROGEN METABOLISM IN RUMEN BACTERIA. 1984-1989

A. Kistner

Although ammonia has long been recognised as the major source of nitrogen for microbial growth in the rumen, and ammonia transport across the cell wall could be a growth rate-limiting step, little is known about the kinetics of ammonia transport in rumen bacteria. With a view to using the stable isotope ^{15}N for studies of this aspect, an apparatus for the automatic determination, by emission spectrometry, of atom percentage ^{15}N in large numbers of samples was developed.

The apparatus is capable of analysing 12-20 samples per hour, accept sample masses between 0,5 and 100 mg and requires only 10 μg amounts of N for accurate and reproducible determinations. However, because of the small amounts of ^{15}N -enriched ammonia transported across the cell walls in short-term labelling experiments, in relation to the total nitrogen content of the cell preparations, and because of the relatively high natural abundance of ^{15}N (0,365 %), the technique proved to be too insensitive for reliable kinetic studies of ammonia transport. The emphasis, therefore, shifted to studies of quantitative aspects of ammonia assimilation in growing cultures of a predominant ruminal bacterium, *Selenomonas ruminantium*.

The organism was grown anaerobically in a chemostat on a chemically defined medium with ammonia as the growth-limiting nutrient, and the steady-state concentrations of residual ammonia, bacterial dry mass and cell nitrogen were determined over a range of dilution rates between 0,08 and 0,73 h^{-1} . At the same time, cells were harvested, disrupted in a French pressure cell and the activities of the enzymes which have been reported to be involved in ammonia assimilation in this organism, namely glutamate dehydrogenase (GDH), glutamine synthetase (GS) and glutamate synthase (GOGAT) were determined, using established methods.

From the data of residual ammonia concentration versus dilution rate, a saturation constant (K_s) of 93 μM for ammonia was calculated, using the Eadie-Hofstee transformation of the Michaelis-Menten equation. Since ammonia was limiting, this K_s value can be ascribed to the high-affinity GS-GOGAT enzyme system. This implies that *S. ruminantium* can attain 95 % of its maximal growth rate at an environmental ammonia concentration of 2mM.

The specific activity of GDH, the low-affinity system, increased with increasing ammonia concentration, whereas above 1mM GS activity decreased markedly. This implies regulation of the two enzyme systems by the environmental ammonia concentration, although GDH probably fulfilled a catabolic role at low concentrations. The efficiency of ammonia uptake, expressed as grams of ammonia utilised per gram of cells produced per hour, increased ten-fold from the lowest to the highest growth rate.

However, the growth yield, expressed as grams cells produced per gram of ammonia utilised, decreased from 11,0 at the lowest growth rate to 7,3 at the highest. This may mean that, although low concentrations of ammonia are adequate for near-maximal growth rates of rumen bacteria in their ecosystem, they do not necessarily provide for maximal yields of bacterial cells, since ATP has to be diverted from other growth processes to allow for the assimilation of ammonia.

Growth yield, expressed as grams of cell nitrogen produced per gram of ammonia nitrogen utilised, was <1 at all growth rates studied. This apparent inefficiency of ammonia incorporation was due to the excretion of amino acids (mainly alanine and glutamate) by the cells. It is not clear whether the excretion of products of ammonia assimilation fulfils a regulatory function in the metabolism of the species concerned, but it can be expected to play a role in inter-species crossfeeding in the microbial community of the rumen.

AGRICULTURAL RESOURCE UTILISATION RESEARCH

RESOURCE RESEARCH

Primary resources

SOIL

- *Soil science*

V.5111/32/1/1:

ESTIMATION OF SCOOPED SOIL DENSITY AS A RAPID MEASURE OF PHOSPHORUS
FIXATION AND SOIL TEXTURE. 1985-1989

M.A. Johnston, M.P.W. Farina and J.Y. Lawrence

In soil testing laboratories it is necessary to know the approximate texture of soil when giving fertiliser advice. The mass of soil measured in a standard soil scoop, i.e. the sample density, has been shown to be strongly related to soil texture.

Using a regression equation developed for a group of Natal soils, i.e. $\text{Log}_e (\text{Clay \%} + 1) = 7,87 - 3,84 \times \text{Sample Density}$, the estimate of clay content from sample density proved to be more reliable than that by finger testing.

The use of sample density for estimating soil texture is very well suited to routine soil testing laboratories.

Surveys and demarcation

LAND USE

- *Situation analysis*

N.5135/35/1/1:

SURVEY OF LAND USE AND FARMING IN NATAL (AGRIQUEST). 1979-1989

J.M.B. Smith

In October 1979, questionnaires concerning the season ended 30 June 1979 and a map for indicating farm locations were sent out to some 9 000 addresses. Supported by a concerted publicity campaign the survey succeeded in gathering the agricultural land use information.

A suitable grid system and information storage cell was selected for the large amount of data to be stored and processed without losing geographical identity. The grid employed was based on the 31° E GAUSS Conform System.

All data was computerised and analysed on the main frame.

The survey succeeded in gathering agricultural land use information of 69 % of privately owned farms in Natal involving 5 979 farmer participants.

The results of the survey are contained in a very comprehensive document published in 1981 entitled *AGRIQUEST: Postal Survey of Agricultural Land Use* Dept. Agriculture and Fisheries, Natal Region.

RESOURCE UTILISATION RESEARCH (CROPS)

Field crops

SMALL GRAIN

• Pests

V.5212/20/1/1:

SMALL GRAIN: INVESTIGATION ON THE OCCURRENCE OF THE BROWN WHEAT MITE UNDER DRYLAND CONDITIONS AT GLEN. 1984-1988

J. de Jager

Brown wheat mite, *Petrobia latens*, infestation on dryland wheat at Glen occurred sporadically from the middle of July (Growth Stage 6 of wheat) until approximately the end of October (Growth Stage 24). Depending on environmental factors, the critical period of infestation can be regarded as from the third week in August (Growth Stage 13) until the middle of October (Growth Stage 24).

Diapause eggs were produced immediately after emergence of the mite. Humid conditions at the beginning of infestation, followed by relative dry periods, lead to an increase in population density with the production of numerous diapause eggs. The presence of vast amounts of diapause eggs, followed by thunderstorms during the middle of August until the end of September, have the potential for a rapid increase in the population density of the brown wheat mite. The presence of diapause eggs from the middle of October, irrespective of environmental conditions, seems to be irrelevant.

From this study it is evident that in the growing season of dryland wheat the presence of vast numbers of diapause eggs from the third week in August until the end of September, in combination with the amount and distribution of rainfall, are primarily responsible for a rapid increase in the population density of the brown wheat mite.

V.5212/20/1/2:

SMALL GRAIN: INVESTIGATION ON THE EFFECT OF THE BROWN WHEAT MITE ON GRAIN YIELD AS WELL AS POSSIBLE CONTROL MEASURES UNDER DRYLAND CONDITIONS AT GLEN. 1985-1988

J. de Jager

Owing to the low mite infestation during the investigation period no spray treatments could be applied. The small variation in the infestation rate during the 1985 growth season of wheat at Glen made it difficult to determine a significant effect of the brown wheat mite on dryland wheat production.

However, the results showed that wheat production was affected at relative low mite infestation rates.

OIL AND PROTEIN SEEDS

• Pests

H.5213/20/1/1:

THE MONITORING OF INSECTS ON GROUNDNUT FIELDS IN THE HIGHVELD REGION. 1986-1988

C.F. van Eeden

A survey of all the insects occurring in groundnut fields was undertaken during the 1986/87 and 1987/88 seasons at four localities, namely: Wesselsbron; Makwassie; Hartbeesfontein and Coligny. A one-hectare experimental plot was sampled with four different techniques at weekly intervals at each locality.

A check list which was compiled revealed that insects of 10 orders, 48 families, 80 genera and 105 species were present. The species diversity varied very little at the various localities but the composition of the insect complexes fluctuated considerably at the respective localities at any particular time during both seasons. Certain insects occurred early in the season and others towards the end of the season.

The Coleoptera proved to be the most dominant order with the Tenebrionidae and the Curculionidae as the dominant families. Most of the insects had a random distribution in the experimental plots, but the Curculionidae and *Hilda patruelis* both showed a tendency to occur more frequently on the sides of the experimental plots.

Garden crops

VEGETABLES

• Pathology

N.5222/19/2/1:

EFFECT OF DIFFERENT FUNGICIDES AND FERTILISATION ON THE DEVELOPMENT OF LATE BLIGHT, EARLY BLIGHT AND *SEPTORIA* LEAF SPOT IN THE TOMATO CULTIVARS FLORA-DADE, MONEYMAKER, ROMA AND ROSSOL. 1984-1988

W.G. Nevill

The effects of different fungicides, combinations of fungicides and fertilisation on the development of the fungal foliar diseases such as late blight, early blight and *Septoria* leaf spot were investigated in four tomato cultivars were investigated under Natal Mistbelt conditions, over four seasons at the Cedara College of Agriculture.

Late blight was a major problem during each of the four seasons and masked the effects of early blight and *Septoria* leaf spot. However, late blight was effectively controlled by the fungicides Bravo and Mancozeb and by programmes containing these fungicides. Sumisclex, ineffective against late blight and *Septoria* leafspot, proved very effective against early blight when used in programmes with an effective late blight fungicide. Benlate appeared to have some effect on *Septoria* but, as with early blight, this fungus was overrun by late blight.

No conclusions could be drawn as to the effect of fertilisation on the development of disease, early blight in particular. It is suggested that fertility x disease experiments should be investigated under controlled soil, environmental and disease conditions and not under field conditions, especially where the danger of crop devastation by late blight is always present.

The processing cultivar Rossol is a useful experimental cultivar as it is resistant to eelworm and produces a heavy yield of small fruit (in relation to Flora-Dade) and it is susceptible to infection by late and early blights.

RESOURCE UTILISATION RESEARCH (ANIMALS)

Ruminants

LARGE STOCK

• Physiology

D.5311/03/1/1:

LARGE STOCK: HORMONAL STATUS AND CALVING PERCENTAGE OF BEEF COWS AND HEIFERS IN THE SOURVELD. 1979-1988

J.A. Erasmus

The experiment was conducted to determine whether nutritional differences between the sourveld and mixed sweetveld were reflected in the occurrence of oestrus and the secretion of gonadotrophic and gonadal hormones during various reproductive physiological phases. During 1979 heifers and cows were run on the sourveld and received an NPN supplementation during the winter (sourveld + NPN); during 1980 heifers and cows were run on the sourveld and mixed sweetveld (mixed sweetveld + NPN). From 1981 onwards, a third treatment was added; heifers on the sourveld received a bone meal/salt lick during the winter (sourveld - NPN).

The occurrence of oestrus was 100 % in heifers on the sourveld during 1979, and in heifers on the sourveld and mixed sweetveld during 1980. During the following year 62,5, 92,9 and 93,3 % of heifers on the sourveld + NPN, sourveld - NPN and mixed sweetveld groups exhibited oestrus. The mean lengths of oestrous cycles in heifers on the sourveld and mixed sweetveld were 19,1 and 20,9 days, respectively.

All cows on the sourveld and mixed sweetveld exhibited oestrus. Mean oestrus cycle lengths were 20,2 and 18,6 days, respectively. Normal oestrous cycle lengths (18-23 days) occurred in the majority of cows (60-70 %) and heifers during the 1979 and 1980 seasons. A relatively large proportion of heifers during 1981

had irregular oestrous cycles (sourveld - NPN, 64 %; mixed sweetveld, 46 %) or showed no oestrous activity at all (sourveld + NPN, 37 %).

45,1 % of heifers exhibited oestrous during the night, and 14,3 % during the day. In 40,7 % of heifers, oestrous was initiated during the night and was still visible the following morning. In cows, the incidence was 19,2, 16,4 and 64,6 %, respectively. The mating body mass of 345 kg is sufficient for virgin heifers to obtain calving percentages of 90 % and higher. However, a body mass of 500 kg for heifers mated during the second mating season did not ensure a high calving rate. A *post-partum* body mass of 385 kg is sufficient to maintain a time lapse of 50 days between calving and first oestrus in first-calf cows. A mass of 486 kg shortened this period by only 5 days. In second-calf cows, body mass of 520 kg and 363 kg resulted in the interval being 49 and 84 days, respectively.

In blood samples it was found that oestradiol concentrations of heifers on the sourveld were consistently higher than those of heifers on the mixed sweetveld. Oestradiol concentrations were also generally higher in the first sourveld group than the second.

In the two sourveld groups, oestrous activity was exhibited before the oestradiol peak, whereas in heifers on the mixed sweetveld, most exhibited oestrus at or after the oestradiol peak. An increase in oestradiol concentrations were observed at or close to the pre-ovulatory LH surge in 16 of the 20 heifers. Seven heifers indicated a definite rise in oestradiol levels simultaneously with the pre-ovulatory LH surge. An increase in oestradiol levels was also noted in most heifers around oestrous activity.

Heifers on the mixed sweetveld had a significantly ($P < 0,05$) higher FSH surge during oestrus than heifers on the sourveld. In most cases, the FSH surge followed oestrous activity in the sourveld heifers, whereas the reverse trend was noted in mixed sweetveld heifers.

Base line LH concentrations were significantly higher in heifers on the sourveld than in heifers on the mixed sweetveld. However, the mean pre-ovulatory LH surge was 26,6 % higher in heifers on mixed sweetveld (36,28 ng/ml) than in the two sourveld groups (28,8 and 28,5 ng/ml). The sourveld heifer groups exhibited oestrous activity before or during the pre-ovulatory LH surge, whereas oestrous activity was recorded during, or after the surge in the mixed sweetveld heifers.

In two heifers on the sourveld, numerous LH pulses during oestrous showed clear oestrous activity but insignificant pre-ovulatory LH surge peaks indicated that they had not ovulated.

During the 1979 season, mean progesterone and oestradiol concentrations during the oestrous cycles of heifers and cows on the Dohne sourveld were 3,6 ng/ml and 17,4 pg/ml, respectively. During the 1980 season, progesterone concentrations of heifers and cows on the sourveld and mixed sweetveld were 6,01 and 3,81 ng/ml, respectively ($P < 0,001$). Oestradiol levels were higher in females on the sourveld than in females on the mixed sweetveld.

Heifers had significantly lower progesterone concentrations than cows. Oestradiol concentrations did not differ significantly between heifers and cows during 1979 but were lower in heifers during the 1980 season.

Progesterone concentrations tended to increase slowly from oestrus (Day 0) to Day 5 in females during the 1979 season. Marked differences between individual profiles were noted. During the 1980 season, however, progesterone concentrations increased more rapidly after oestrus. One heifer and one cow displayed abnormal progesterone profiles which could not be related to the oestrous cycle. The fluctuation in oestradiol levels during the oestrous cycle, could also not be related to the cycle. In some females, oestradiol levels increased around oestrus.

Progesterone concentrations were significantly lower in heifers on the sourveld + NPN and sourveld - NPN, than in heifers on the mixed sweetveld during 1981. Similar results were obtained during the mating season of 1982. During the 1983 season, no significant differences were noted between heifers in the first sourveld group and those on the mixed sweetveld. Heifers on the sourveld - NPN treatment exhibited no oestrus and no progesterone concentrations were recorded.

In 33 % of the animals observed during the 1980, 1981 and 1982 seasons, an increase in progesterone concentrations did not follow observed oestrous, or females had abnormal progesterone profiles. In most of these cases, the animals were repeatedly mated, but failed to conceive. There was a tendency for fertile heifers to have higher progesterone concentrations than infertile animals.

Progesterone concentrations tended to be depressed in pregnant heifers on a higher feeding regime.

During the 1981-1983 seasons, level of nutrition did not consistently influence progesterone concentrations on days 0, 5, 10, 15, 18, 20 and 22 of pregnancy. However, in blood samples taken at weekly intervals levels of plasma progesterone showed some variation for heifers on the sourveld + NPN, sourveld - NPN and mixed sweetveld.

Pregnant heifers had significantly ($P < 0,001$) higher progesterone concentrations than non-pregnant animals. Pregnant heifers receiving an NPN supplement had higher progesterone concentrations than unsupplemented heifers during the winter seasons of 1981-1983.

The time lapse between parturition and the first progesterone spike of $>1,0$ ng/ml varied, for cows in the sourveld + NPN, sourveld - NPN and mixed sweetveld + NPN treatments during 1981-1983.

Progesterone concentrations immediately after calving were also elevated in cows on the sourveld + NPN, sourveld - NPN and mixed sweetveld. After 40 days *post-partum*, no trend regarding the influence of nutrition on progesterone concentrations were visible.

In this study, a progesterone concentration of 4 ng/ml was considered essential for maintaining pregnancy. Levels decreased below this in numerous cows and heifers for short periods only during different stages of pregnancy. Resorption of the embryo and/or abortion occurred in one cow and three heifers during the experimental period.

Oestradiol concentrations were influenced by the level of feeding during the first three months of pregnancy only. During the last six months of gestation, average oestradiol concentrations showed little variation.

- *Reproduction*

N.5311/04/1/5:

LARGE STOCK: THE RELATIONSHIP BETWEEN LIBIDO SCORE AND MATING ACTIVITY IN *BOS INDICUS* BULLS. 1987-1989

J.S. Crichton

Certain of the factors which influence the pen and subsequent field mating activity of young (20-month-old) Afrikaner bulls were investigated in an attempt to establish the feasibility of using libido tests to evaluate sexual activity in *Bos indicus* bulls.

Eighteen inexperienced Afrikaner bulls were subjected to pen libido tests which involved the exposure of a group of three bulls to two restrained, ovariectomised, oestrous-induced cows for 30 minutes, following a 10-minute period of sexual stimulation. The frequency of mounts and completed services were recorded. Tests were conducted with and without the presence of an observer and during the daylight and night hours. Following the completion of these tests, eight bulls, varying in score obtained under the pen tests, were selected for evaluation under conditions of natural mating. They were randomly mated to oestrous-synchronised heifers and dry cows under veld grazing conditions.

During the serving capacity tests, bulls showed no preference for nocturnal sexual behaviour and were not hindered by the presence of personnel scoring their activity. Many of the bulls did not serve consistently from one test to another. However, their serving capacity improved with the progression of the tests. The inconsistent serving behaviour of the bulls suggested that restrained females do not present the ideal mating stimulus.

Furthermore, agonistic interactions had a depressive effect on sexual behaviour. There was, however, a significant relationship between pen and pasture mating behaviour reflected in high serving-capacity bulls achieving superior conception rates to low serving-capacity bulls. Pasture mating performance was significantly influenced by degree of cow receptiveness, the bull's previous activity and duration of his exposure to an oestrous female within a given observation period. The need to identify the specific oestral characteristics which attract and promote copulatory behaviour in *Bos indicus* bulls was established.

In practice the relatively large requirements, in terms of manpower, time and funds mitigates against the standard use on farms of libido tests to evaluate sexual activity in bulls. Should these problems be overcome, libido tests do, however, provide a means of establishing sexual activity in *Bos indicus* bulls.

RESOURCE UTILISATION RESEARCH (PASTURE)

Pasture

VELD

- *Potential studies*

D.5411/36/3/1:

THE ASSESSMENT OF VELD CONDITION AND THE EVALUATION OF THE FACTORS AFFECTING THE GRAZING CAPACITY OF THE DOHNE SOURVELD. 1983-1989

M.J. Willis

A number of important conclusions emerged from the study. Firstly, it can be concluded that the technique currently used for assessing veld condition in the Eastern Cape and Ciskei is both scientifically and

practically sound. This is because it is the only technique developed so far which addresses veld condition as a whole in that it includes both ecological and agronomic aspects.

The ecological component comprises categorising the different grass species according to their response to grazing pasture. The agronomic component involves assigning individual forage factors to the different grass species which serves as an indication of the forage production potential of the veld and can be used for estimating the grazing capacity of the grass sward. The fact that many farmers and extension officers have already been successfully trained to assess veld condition using this technique indicates its importance and usefulness at the user level.

However, additional research is needed to further refine and quantify the technique in terms of obtaining a more objective categorisation of the different species according to their response to grazing pressure. Furthermore, the forage factors allocated to the different species need to be refined and tested under grazing conditions.

Secondly, the success of the key species technique in providing a simple, yet accurate and precise, method for assessing veld condition, is an exciting development. For the first time the assessment of veld condition has been placed within the reach of non-pasture specialists. In the short time since its development, it has already been successfully used at farm scale and is currently being applied as the technique for monitoring veld condition in the Kruger National Park. It has also spawned three major research projects in Ciskei, Bophuthatswana and Kangwane where the key grass species are being identified in order to develop simplified techniques for assessing veld conditions in the agricultural and wildlife spheres. This will assist in the formulation of realistic veld management practices that are sorely needed in these areas.

Thirdly, the conclusion that a single calibration of the disc pasture meter can be used for the Dohne sourveld (sourveld) and the False thornveld of the Eastern Cape (sweetveld), is an important development. It is probable that the same calibration can be used in a number of other veld types. In the Eastern Cape and Ciskei field experience indicates that the calibration developed for these two widely differing veld types could also be used in the dry Cymbopogon Themeda veld, the Coastal forest and thornveld, the Eastern Province thornveld and the Highland sourveld. This needs to be tested as this would greatly simplify the use of the disc pasture meter by farmers, consultants, extension officers and wildlife managers in these areas.

Future research should also be aimed at comparing calibrations of the disc pasture meter for veld types in other parts of the country in an attempt to further simplify its use. It is essential, however, that the procedure followed for calibrating the disc pasture meter be standardised. It is recommended that the procedure described by Trollope and Potgieter (1986), be adopted.

Finally, drawing meaningful conclusions from the results of the cutting trial is difficult. This is because the results were intended to verify and supplement the findings obtained from the analysis of the grazing records. The failure of the analysis of the grazing records to provide meaningful results, therefore, minimises extrapolation from the cutting trial to the grazed situation.

Furthermore, the exclusion of the data for the first growing season effectively excluded rainfall and air temperature as environmental factors influencing the dry matter production from the different sites. This is because the differences in the rainfall and air temperatures recorded at the different recording sites in the study area were not biologically significant. Therefore, to test the effects of these two parameters on the dry matter production of veld, measurements would have to be made over a period of time of not less than two growing seasons.

However, important conclusions that can be made from the trial are that VCS is poorly related to dry matter production and that aspect has a positive effect on the dry matter production of Dohne sourveld. The reasons for the poor relationship between VCS and dry matter production could be either that there is no significant relationship between the two parameters or, that the range in VCS in this study, was not large enough for its effect to be measured. It is inconceivable that species composition and therefore, VCS, has no effect on dry matter production because different plants grow at different rates.

It is probable that the narrow range in VS-values was responsible for its lack of effect in this trial. The effect of aspect on dry matter production is expected because of the more favourable moisture regime of the southern slopes. A further important conclusion is that future research of this nature should rather be in the form of grazing trials conducted in co-operation with progressive farmers.

• Management

D.5411/41/1/3:

VELD: PATTERN AND CONSUMPTION RATES OF *ACACIA KARROO* COMMUNITIES BY GOATS AS A FUNCTION OF STOCKING PRESSURE IN THE CENTRAL GRASSVELD OF THE EASTERN CAPE. 1987-1988

W.R. Teague

Measurements were made to quantify the consumption of browse and grass in a representative *Acacia karroo* savanna community. *Acacia karroo* was preferred to grass. It was selected almost exclusively when available at high leaf densities. Grass was consumed in significant amounts only when approximately 50 % of the available *A. karroo* leaf had been consumed. Maximum daily intake was 78 g W kg day⁻¹ and decreased with decreasing amount of browse on offer. When approximately 90 % of the available *A. karroo* leaf had been removed, the goats had consumed only 30 % of the available grass. Total intake of browse plus grass was lower during the period when the goats changed from consuming mostly *A. karroo* to consuming most grass. Goats do not appear to select a diet according to their nutritional needs, as judged by feeding tables, when they could have done so. This may be due to protein indigestibility caused by tannin complexing or differences in palatability.

When browsing *A. karroo* plants, goats select for the highest density of leaf. This is modified by other factors related to palatability and efficiency of harvesting. The plants in the 1,5-m class were browsed in preference to larger or smaller plants. Mature leaf and shoot was consumed more readily than young leaf and shoot. The digestibility of shoot and leaf on plants of all sizes decreased following browsing by goats.

• Modelling

D.5411/42/1/1:

VELD: A MODEL SIMULATING THE EFFECT OF PROBABLE USES OF THE NATURAL VEGETATION IN THE THORNBUSH-GRASS COMMUNITIES IN THE CENTRAL GRASSVELD OF THE EASTERN CAPE. 1987-1988

W.R. Teague

The model gives a reasonable reproduction of the shoot and leaf growth used to develop it and a reasonable prediction of leaf growth when tested against independent shoot growth was poor. Qualitatively, the model responded in accordance with the biological findings of the experimental section. Thus plants are very sensitive to defoliation early in the season and are stimulated by moderate to heavy defoliations during the rest of the growing season. It also emphasises that long (4-6 months) rest periods following defoliation are necessary for maximising production.

The sensitivity analyses indicate that three parameters in particular have a very strong influence on the output of the model. These are, moisture, soil depth and the magnitude and duration of stimulation following defoliation. Plant size and the defoliation carry-over from one year to the next had a moderate influence.

The model is particularly useful in regard to interpreting the experimental results for management purposes. The range of possible management systems and practices examined here could only be considered using a modelling approach. Some of the possible systems and strategies show considerable promise. They point the way to areas of research that could provide important steps forward.

Of particular interest is the prediction that using a one-camp system and withholding stock for two months at the beginning of the season when the plants flush, would result in higher overall production. Using the most sophisticated grazing systems with many camps resulted in lower production if stock were not withheld at the beginning of the season. This questions the management systems currently being advocated in Southern Africa, and emphasises the need for research from the top downwards.

CULTIVATED PASTURE

• Management

D.5413/41/1/1:

CULTIVATED PASTURES: POTENTIAL OF SUMMER GRASSES IN THE EAST COASTAL AREAS OF THE EASTERN CAPE REGION. 1977-1985

T. Daines

Growth and production of summer subtropical grasses were monitored at eight sites in the coastal belt stretching from the Fish River in the east to the Groot River on the western boundary of the Tsitsikamma.

Each co-operative site represented a distinct agricultural zone in the coastal belt and covered rainfall zones from 500 mm to +1 000 mm.

In the Alexandria-Bathurst magisterial districts all sites were on Hutton soil forms. In the Humansdorp - Tsitsikamma area, sites were confined to the sandy soils with one exception where the site was on soils derived from Bokkeveld shales. Grasses that were evaluated were Rhodes grass (*Chloris gavana* var. Katambora), Smuts finger grass (*Digitaria eriantha*), Love grass (*Eragrostis curvula*), Kikuyu (*Pennisetum clandestinum*), Stargrass (*Cynodon aethiopicus*), Coast cross II (*Cynodon dactylon* cv. Coastal x *C. nlemfuensis* var. robustus), Sabi panic (*Panicum maximum* cv. Sabi).

The results show that environmental and climatic factors coupled with the applied management, have a controlling influence on grass production. Herbage production data showed that where rainfall was unpredictable longer rests between harvests significantly increased dry matter production. Changes in the nutritive value of grasses during different times of the year and at different harvesting intervals are presented. To obtain the maximum production of quality feed from pastures, the rest period between harvests should be between 50 and 60 days, the shorter period where high, well distributed rainfall occurs and conversely the longer inter-harvesting period where rainfall is low and the distribution of the rainfall is unreliable.

Sandy soil sites in the Humansdorp area produced higher DM yields than the heavier soil sites indicating the need for longer rests for pastures grown on heavier soils. Moisture stress could possibly be the main factor limiting production on the heavier clay soils in the coastal belt. This investigation also shows that there are two distinct homogeneous zones in this coastal belt and predictions of plant growth and production from one zone for the other cannot be made, necessitating trials within each zone to characterise growth and production of different grasses within each zone. The dividing line between the two distinct homogeneous zones lies to the east of Port Elizabeth near the Sundays River.

D.5413/41/1/14:

CULTIVATED PASTURE: COMPARISON OF EIGHT WHITE CLOVER CULTIVARS UNDER DRYLAND CONDITIONS ON A MISPAH SOIL IN THE HIGH RAINFALL SOURVELD AREAS OF THE EASTERN CAPE. 1986-1988

C.J.G. le Roux

Work at Dohne showed that some white clover cultivars were not as productive as other perennial legumes under dryland conditions in the Dohne sourveld. However, researchers at Cedara had introduced a white clover which was reported to be deeper rooted than other cultivars, and it was decided to compare this cultivar (Duzi No. 2) with other cultivars under dryland conditions at Dohne.

This trial was conducted at the Dohne Research Station, on a locally common soil of the Soetmelk series. Before establishment, 1 000 kg of single superphosphate (10,5 % P) and 400 kg of muriate of potash were applied per hectare. In subsequent years, 400 kg of superphosphate and 400 kg of muriate of potash were applied per hectare in spring. A trace element mixture of 5 kg iron sulphate, 2,5 kg of zinc sulphate, 120 g of copper sulphate, 120 g of sodium molybdate and 9 kg of boric acid were applied per hectare in September 1987.

The experiment was laid out in three randomised blocks as replications. The cultivars under comparison were Duzi No. 2, Bayacua, Huia, Ladino, S100, S184, Haifa and Tamar. A seeding rate of 4 kg/ha was used. Gross plot size was 1,7 x 5,0 m and there were 1-m wide pathways between all the plots. Net plot size was 0,6 m x 1,7 m, and harvesting was done by a self-propelled flail mower set to cut at 40 mm height. The harvested material was sampled to determine dry matter production.

The trial was clean cut in the spring of 1986/87 and harvested during November. Visual estimates of the canopy cover were made during June 1987 and 1988.

The first half of the 1986/87 season was wet but after November a drought set in. The second season had average, or more, rainfall.

S100 (2,5 t/ha) outyielded most cultivars, excepting Bayacua (1 930 kg/ha) and Ladino (1 780 kg/ha). The other cultivars all yielded between 1 650 kg/ha and 1 450 kg/ha. Duzi No. 2 yielded 1 567 kg/ha. Subsequent to the November 1986 harvest, the growth in the plots did not warrant harvesting, owing to the drought.

The canopy cover of white clover in the plots during June 1987 showed that the clovers lacked the required drought tolerance. The mean values are very low (approximately 8 %) and there are no differences between the means. The clover had disappeared from five of the 24 plots.

During the June 1987 observations it was evident that the plots had already become contaminated with rogue clover types. This may have been the result of pods shattering and disseminating the seed.

Despite the average or above-average rains during the early parts of the 1987/88 season, the clover did not recover to the extent that the experiment warranted harvesting. It was also not possible to keep the experiment in a weed-free condition. It was consequently decided to discontinue the trial.

There were small differences between the yields of the white clover cultivars. However, none of the white clover varieties tested had the drought tolerance necessary to maintain an adequate population under the experimental conditions.

LUCERNE

• *Soil science*

D.5414/32/1/1:

LUCERNE: THE EFFECT OF ACID SOIL CONDITIONS ON ABOVE AND BELOW GROUND GROWTH AND DEVELOPMENT OF LUCERNE WITH SPECIAL REFERENCES TO SEEDLING ESTABLISHMENT IN THE HIGH RAINFALL SOURVELD AREAS OF THE EASTERN CAPE REGION. 1985-1989

G.R. Barnes

The growth, development and accumulation of nutrients in different plant parts of the establishing lucerne plant are reviewed. Plants were established in pots containing soil of the Rietvlei series (Westleigh form) and grown in the glasshouse under conditions simulating the autumn period at Dohne. A range of soil nutritional conditions was established through the use of different levels of applied lime and superphosphate.

Factor Analysis was used to relate numerous soil and plant variables to a few factors. Factor scores were used to describe individual soils and plants along different gradients. Four soil gradients were identified:

- (a) soil liming
- (b) the availability of K, Mg and Zn,
- (c) the availability of P and
- (d) the levels of Mn and Fe in the soil.

Four plant gradients were identified:

- (a) the root:shoot ratio,
- (b) plant productivity,
- (c) plant age and
- (d) the extent of nodulation.

This method of analysis proved to be effective in addressing the objective of soil test experiments which is to observe the soil test value-growth relationship. The data used in this study showed a marked variation and was collected under sub-optimal soil fertility levels. The next step would be to use the method on more reliable field data.

The poor drainage and low fertility of these soils are responsible for poor germination and establishments of lucerne plants. The beneficial effect of applied phosphate on the germination and establishment of both inoculated and uninoculated plants appears greater than that of applied lime.

High soil Mn and Fe levels are associated with decreased productivity. Increased productivity is associated with the translocation of Zn, K, Mn and P to plant tops. Maximum accumulation of P, Mg, and K in stems, and Mn in leaves, corresponds with soil P (ISFEI) levels of 30-36 ppm. It is concluded that conditions for unstressed growth occur at soil P levels of 35 ppm.

Liming promotes root growth and Ca uptake and also reduces the availability of P to the plant. Ca is readily translocated to the leaves, maintaining a constant root Ca concentration of 1,0 %.

Effective nodulation is extremely important on these soils, non-nodulated plants showing higher soil fertility is important for effective infection of roots by either inoculant or indigenous rhizobia.

ANNUAL FODDER CROPS

• *Crop science*

H.5415/30/2/1:

ANNUAL FODDER CROPS: THE INFLUENCE OF PLANTING DATE AND SOIL SERIES ON THE PRODUCTION OF FODDER SORGHUM AND BABALA. 1984-1988

R.H. Drewes

Fodder sorghums and Babala are crops that are used extensively, particularly on farms where dairying is practiced. A relatively large number of sorghum cultivars are available commercially, but little is known of their yield potential and nutritive value.

The experiment was planned to evaluate currently available cultivars of fodder sorghums and Babala on three different soil series (Arcadia, Lindley and Sibasa). There were three replications on each soil serie and the experiment was repeated for three years. Nitrogen fertiliser was applied at a rate of 30 kg N/ha annually when the plants reached an average height of 150 mm. The yields were determined by cutting when plants had reached a general height of 500 - 900 mm. The herbage on the Sibasa series was sorted into leaf and stem material. Crude protein content and in vitro digestibility of dry matter of the entire plant at each cutting were determined.

Because of sporadic availability of the different cultivars from year to year, only seven cultivars could be grown for three years, whereas eleven were included in the experiment for at least one year.

The herbage yield varied widely from year to year, ranging from an overall average of 8,7 t/ha in the first year to 2,4 t/ha in the second year. When ranking total herbage yield in order of magnitude, the following result was obtained: PNR 989, Domor, Babala (SA common), Supergraze, Gotcha, Mixed sorghum and PNR 841. When only leaf production was used as criterion, the ranking was as follows: Babala (SA common), PNR 841, Mixed sorghum, Supergraze, PNR 989, Gotcha and Domor.

The total herbage yields on the three soil series did not differ very much from one another on the Lindley and the Sibasa soil series, whereas the yield on the Arcadia serie, although following the same trends, did appear to be more erratic. The mean yield over the three years was 5,7 t/ha on the Arcadia, 5,83 t/ha on the Lindley and 5,87 t/ha on the Sibasa series.

No consistent trend in terms of crude protein and IVDMD could be detected between cultivars and between soil series, although there was a tendency for Babala (SA common), to have the highest mean crude protein content of 19,16 % over the three years. The IVDMD of all the cultivars evaluated over the three years varied between 60 % and 70 %.

AGRICULTURAL PRODUCTION ECONOMY RESEARCH

Macro resource economy

STRUCTURAL STUDIES

- *Production economics*

PE.5612/48/2/12:

THE ECONOMIC IMPACT OF IRRIGATED AGRICULTURE IN THE SOUTH-WESTERN
FREE STATE. 1987-1989
J.F. Kirsten

The objective of this study is to select an existing technique for determining the nature and extent of the economic impact of irrigated agriculture in the south-western Free State in terms of output, income and employment. After considering various techniques it was decided that input-output analysis is the method best suited for the purpose of this study.

The south-western Free State consisting of the magisterial districts of Jacobsdal, Koffiefontein, Fauresmith, Jagersfontein and Philippolis was selected as the study area. Because a small regional economy is considered, a regional input-output table was constructed. A short-cut technique based on the commodity balance method was used to establish a provisional input-output table. Secondary and primary data were inserted into the provisional table to increase the accuracy of the input-output table. Secondary data obtained from the agricultural census of 1985 were used to construct a more accurate agricultural sector.

Primary data obtained from the irrigation farmers in the area by means of a mail questionnaire were used to establish a seperate sector for irrigated agriculture in the input-output table. Because the regional input-output table was derived from the latest (1985) national input-output table, the derived table provides a picture of the regional economy in 1985.

To calculate the economic impact of irrigated agricultural output, income and employment multipliers were calculated from the regional input-output table. The multipliers for irrigated agriculture are as follows:

Output multiplier	- 1,7012 per unit output (R)
Income multiplier	- 0,1530 per unit output (R)
Employment multiplier	- 89,64 persons/R million output

The magnitude of the backward linkages were determined by applying the multipliers on the direct

impact. After taking the forward linkages into consideration the total economic impact of irrigated agriculture was calculated as:

Output	- R37,38 million
Income	- R 3,27 million
Employment	- 1 853 persons

Irrigated agriculture and its associated activities are directly and indirectly responsible for R37,38 million or 26,15 % of the total output in the south-western Free State. Irrigated agriculture and the associated activities also supply 17 % of total employment and 10,7 % of the household income in the region. It was also calculated that the majority (42,29 %) of the flow-on effects accrue to the trade sector.

Irrigated agriculture covers only 1 % of the total area in the region but produces as much as 40,57 % of total agricultural output. The contribution of irrigated agriculture to the gross regional product (calculated according to value added) amounts to 13,33 %. The economic contribution of irrigated agriculture will be greater in normal years when enough irrigation water is available.

The total economic impact will be greater than the initial or direct impact. This is due to the multiplier effects. These multiplier or flow-on effects are in fact the indirect contribution or indirect effects of irrigated agriculture. The flow-on effects of irrigated agriculture in the south-western Free State for 1985 are as follows:

Output	- R17,24 million
Income	- R 1,88 million
Employment	- 487 persons

In the quantification of costs and benefits of irrigated agriculture it is usually a relatively easy task to quantify the direct benefits or impact. The identification and quantification of the indirect benefits are however, a problem. With the technique used in this study, it is now possible to quantify the indirect benefits of irrigation development. The results obtained in this study are, however, only applicable to one year namely 1985, but it nevertheless gives an indication of the extent of the flow-on effects of irrigated agriculture.

ENTREPRENEUR DEVELOPMENT

EXTENSION SCIENCE INVESTIGATIONS

Resources and technology

MAN

- *Extension science*

H.6115/40/2/1:

STUDY GROUP PARTICIPATION IN AGRICULTURAL DEVELOPMENT. 1985-1990

M.M. Grobbelaar

Objective and procedures

An investigation concerning factors influencing study group participation for greater community engagement in extension strategy planning was launched.

Randomly chosen respondents (99) in the Lichtenburg and Wolmaransstad Extension Wards were interviewed using a personal interview schedule. A panel of community experts classified the respondents into their respective study group participation groups. The data was analysed using accepted statistical methods, namely simple correlations, analysis of variance and the multiple stepwise regression analysis.

Results and conclusions

In order to encourage study group participation, there must be convincing evidence that greater study group participation leads to increased farming efficiency. Five of the six variables tested in respect of study group participation showed statistically significant relationships.

Recent studies indicated the importance of perception as a key-dimension in the process of behaviour change. To obtain a larger degree of community involvement, farmers perceptions concerning factors influencing study group participation were researched.

It is often maintained that financial aspirations motivate behavioural change. Ninety five percent of respondents indicated positive financial aspirations. A statistically significant relationship could, however, not been found between financial aspirations and study group participation. A factor that could have played a role is the drought situation of the past five years which could have lead to irrational reactions and perceptions.

It was found that the active study group members perceive the goals, set by the specific programmes as being financially more favourable. The active members also acknowledge the importance of contact with professionals and the necessity of knowledge, in order to farm successfully. Non-members are most probably not conscious of any financial advantages which could be gained by the acceptance of the various developing practices. Future actions should be directed towards stressing the various financial advantages that can be incurred.

This study also showed that non-members usually do not evaluate their own problems accurately and usually overestimate their own efficiency whereas active members are inclined to underestimating theirs.

Another factor influencing study group participation, is the satisfying of one's original expectations. Active members' original expectations were better satisfied than their inactive counterparts.

In conclusion: eight of the variables used in this study were selected to explain study group participation in broad terms. These variables mostly apply to financial expectations. Active members are of opinion that study group participation can result in greater financial gains. The challenge to extensions therefore, is to influence farmers' perceptions of factors which could result in better study group participation.

PROGRAMMED EXTENSION

Resource utilisation

STOCK AND GAME FARMING

● *Persuasion*

D.6211/39/1/4:

TRAINING FARMERS TO SUBJECTIVELY ASSESS VELD CONDITION IN THE FALSE THORNVELD. 1987-1989.
J.B. Marais

The training comprised a two-day course covering both theoretical and practical aspects of veld condition assessment. The practical training was done by making use of five training sites consisting of veld in very poor condition to very good condition. These sites were subjectively assessed to determine the veld condition scores (V.C.S.). Fifteen test sites were laid out in the same fashion and used to test participants.

The subjective assessment of veld condition is a quick, easy and fairly reliable method of assessing veld condition. The easiest procedure would be to let a number of trained operators independently assess the V.C.S. and use the mean of their estimates. However, if the assessment is to be based on the evaluation of only a few observers, then they should attend a course and be tested for an acceptable level of precision and accuracy.

Where veld condition is to be subjectively assessed there are certain situations (odd-ball sites) where special care must be taken. In some cases the sites can be ecologically so variable as to adversely influence the judgement of the operator or an apparent abundance of certain species, for example, can confuse the operator. On the other hand, there might be non-ecological aspects, such as their training and attitude which affect their judgement.

We believe that the subjective assessment of veld condition score is a practicable alternative to surveying the vegetation and recommended it for farm-planning purposes. It remains to be seen, however, whether subjective assessment would be adequate for monitoring purposes.

N.6211/39/1/1:

PROMOTION OF CULTIVATED PASTURES IN THE DUNDEE EXTENSION WARD.
1984-1989

B.N. Genlloud

The main objectives in this facet were to increase the area planted to pastures by 30 % within 4 years and to increase the efficiency of pasture management of 80 % of the farmers in the study groups.

Because of a low return of postal questionnaires by farmers in the Extension Ward the existing area under pastures (benchmark) could not be established.

The response to the proposed formation of study groups was very positive (4 study groups with 48 members were formed).

The survey done by personal interviews with farmers who had existing pastures indicated sufficient scope for improvement in pasture production and further expansion in the areas under pastures.

The danger of educational programmes which do not meet the perceived needs of the farmers were well illustrated by the lack of the response to the soils course. Although the personal interview survey indicated that the knowledge of soils were low amongst farmers in the study groups, only 23 % of the members attended the soil course.

Fodder flow and stock courses were held for each study group. The expectation that each member would develop a fodder plan for his own farm did, however, not come to fruition. As a result the officer compiled plans for the members, 28 of which were completed. An evaluation of 14 of the cases indicated that 85 % of the farmers interviewed had increased the area under pastures or had used the pastures in decision making.

A short course on pasture establishment was well attended by members and resulted in active participation.

A pasture tour to the Natal Midlands broadened the outlook of 11 study group members who participated.

This programme was conducted in an effort to improve the knowledge of farmers of pasture production and the profitability of pasture systems. Leading farmers were consulted and three target areas identified, i.e. Kokstad, Swartberg and Cedarville. Extension methods used included study group meetings, farm tours, newsletters and individual farm visits. The Department's Mail-In-Record keeping system was used to evaluate costs and production systems. Topics covered during group activities were as follows:

- Economics of pasture production
- Cost effective feeding
- Conservation of pasture (hay and silage)
- Pasture species selection
- Pasture irrigation
- Soil and seedbed preparation
- Pasture fertilisation
- Farm business management
- Production off rye grass

The objective with farm visits was to determine the pasture needs of the farmer, and to advise on the suitability of pastures, the areas required and the management of pastures. Relevant information was included in newsletters sent out to participating farmers in an attempt to strengthen motivational forces.

A problem arose in the lack of continuity of attendance at the study group meetings. Farmers attended on a selective basis in terms of their specific needs. The increased demand for farm visits and decreasing interest in educational group meetings indicated a greater need for on-farm advice than for group extension methods. The programme was terminated after two years as considerable progress had been made in the field of pasture production and a livestock orientated project was considered a greater priority.

The strategy of the programme, was to deal with eight target farms, belonging to five farmers in the Kamberg area. Although the number of farms was small, the area covered was considerable (14,000 ha). A study group was formed and an assessment was made of the problem in the area. Demonstration plots were laid out on some of the members' farms, so that various chemical treatments could be evaluated.

The five farmers concerned, were encouraged by means of regular meetings and personal visitation, to systematically carry out a spraying/eradication programme on their farms so that the objective of the programme could be achieved.

The programme was terminated in the 1985/86 report year. The eradication of the bramble did not go according to plan, because of:

1. Farmers were reluctant to spray until demonstration plots showed positive results.
2. Economic pressures had an inhibitive effect on spraying. Bramble was a problem that the farmers could live with.

A survey carried out in 1984/85, showed that:

1. Those farms with a high degree of infestation at the beginning of the programme, had a similar or worsening situation after five years.
2. Those farms with a light infestation, had improved their situation.
3. Regular labour to handle this problem was seen as a requirement by the farmers concerned.
4. Inaccessible terrain was another very real problem, especially on some farms.

Overall results showed that, of the 5 original participants in the programme, one had achieved complete control, one had achieved 80% control, whilst the remaining three claimed a steady worsening of the situation.

In each of these three cases, the farms were very large, and the problem was 'beyond' the farmer's control. The only possible solution to this problem, might well be a regular "bramble gang" (subsidised by the Department).

• *Management*

N.6211/41/1/1:

ANALYSIS OF BEEF PRODUCTION MANAGEMENT SYSTEMS ON VELD IN THE
UNDERBERG EXTENSION WARD. 1985 - 1989
C.M. Green

In order to determine the performance of beef animal on Highland sourveld under management systems practised in the ward, the monitoring of beef production management systems on two farms with different levels of management, was undertaken on a co-operative basis in the Underberg Extension ward during the 1985/86 growing season.

A group of cows and calves on a veld grazing management system was selected on each of the two farms. The animals were mass-measured and condition-scored when they went onto the veld in the spring and monthly thereafter until the calves were weaned. Thereafter, the cows were mass-measured and condition-scored until they were removed from the veld for overwintering. Veld condition assessments were carried out in November 1985 on both farms. In addition a wide range of management activities, for example, date and length of breeding season, which could have had an influence on either the animal performance or the response of the veld to the applied grazing system, were recorded.

Over the season livestock production showed a total gain of 93,4 kg beef per hectare on Farm I. On Farm II the gain of beef from veld over the season was 32,5 kg per hectare.

The importance of correct subdivision of veld types was illustrated by the wide variation in veld condition of the different veld sub-types, and the need for sufficient veld assessments to allow the identification of the different veld sub-types to be identified.

The livestock movement within the rotation grazing system should be such that the requirements of "period of stay" not exceeding 10 days, and "periods of absence" not exceeding 50 days should be met.

Indications are that on farms with rolling terrain and adequately camped and stocked, much higher returns in terms of kilograms of beef per hectare can be expected than with an extensive farming operation with large tracts of rough terrain and insufficient livestock.

• *Modelling*

N.6211/42/1/1:

STOCK AND GAME FARMING: DEVELOPMENT OF A BEEF FEEDING SIMULATION
MODEL. 1975-1989
B.P. Louw

A model to simulate the physical and economical consequences of feeding beef cattle between weaning and marketing was built by a group of scientists which included animal and pasture scientists, economists and system analysts. The factors which could be varied in the model are: bank overdraft rate, long-term borrowing rate and period, wages paid, transport costs, veterinary costs, managerial efficiency, sex of animals, initial mass and value of animals, type of animal, capital costs to initiate envisaged feeding programme, cost and feeding value of all feeds, palatability of feeds, animal exercise factor, proposed feeding programme, selection of animals into different batches. The model produced, for a given set of the aforementioned variables, a prediction of animal performance, total feed requirements, total costs and profit, over any stipulated period of time.

A manual was produced for the model, which was called "Natal Simulator of Beef Feeding Trials" or NSBFT. The building of the model proved valuable for identifying knowledge gaps and in fostering a team spirit amongst scientists involved in different disciplines. The model was used after its completion, but, mainly because no beef extension specialist was available to encourage its use amongst farmers and advisors, it fell into disuse.

This facet emphasised the importance of having specialist extension staff available to encourage the use of simulation models.

N.6211/42/1/2:

DEVELOPMENT OF A DAIRY HERD COMPUTER SIMULATOR PROGRAMME. 1979-1989
P.G. Stewart

The objective of this investigation was to build a computer model which:

- (i) predicts the level of milk production at any time of the year;

- (ii) specifies dates of calving and number of cows in lactation at any time of the year based on dates of serving and conception diagnosis;
- (iii) assesses the inflow of cash from the sale of milk, cost involved in feeding of herd, other costs expected in the running of the dairy herd and, then summarises the profits on this particular farm and finally predicts the financial implications if any components in the model are changed;
- (iv) predicts herbage and concentrate requirements based on the feeding charts.

Another aim of this study was, furthermore, to get the models into use on the farms, and to improve them as experience is gained.

Development of a computer model to simulate the production from a dairy enterprise began in 1974 following a visit to Natal by Dr Peter Street. He had brought with him a dairy herd simulation model developed at Nottingham university. Mr R.I. Jones has been almost entirely responsible for the computer coding with some invaluable assistance, especially in the analysis of lactation curves for Mr S.M. Minnaar.

For ten years the DAISI programme was really the only programme that could be used for doing "desk top" experiments in dairy farm planning and as such was used a great deal by advisors to answer questions of the "what if?" type. For example, the Kokstad Extension Officer used the model to examine the implications of seasonal calving in East Griqualand. As a result of this investigation at least two farmers swung completely over to a strictly seasonal production system.

The model was also used to examine a series of practical fodder flows for the various bioclimatic regions of Natal.

Being fairly complex, DAISI has always needed an advisor to assist the farmer in filling in the forms and especially in interpreting the output. As there are few full-time dairy advisors and these have, in recent years moved away from batch processing on main frames to real time processing on micro's, the demand for DAISI has declined.

The main use among farmers was in the analysis of his current situation and prediction of future production trends. To this end the program was used a great deal until about 1982 when NCD, a major user through their advisors, found it necessary to curtail their activities in this field. Thus, for about eight years DAISI was regularly used by over 80 farmers. With the development of the CEDARA dairy feeding programme, which does many of the things DAISI does, this use has declined, especially over the last three years, until the present when it was used about 15 times in the last 12 months. Perhaps it's greatest impact was in teaching advisors how important dairy herd fertility and especially fodder flow is to profitable milk production.

DAISI was the pioneer model which gave the Natal Region it's first real experience of what can be done with computer modelling and gave the dairy advisors of the whole country their first experience of computer-aided farm decision making. DAISI brought many to understand, for the first time, the dynamic interaction between animal, environment and manager, in farm profitability.

The CEDARA dairy feeding programme, the whole fodder planning concept and much of the book "Feeding and Management of Dairy Cattle in Natal" were built on the foundation of the DAISI experience.

N.6211/42/1/5:

FODDER PRODUCTION PLANNING FOR FARMING UNITS. 1977-1989
R.I. Jones

The aim of this experiment was to:

1. Develop procedures, including manuals and computer programme where necessary, for use in planning a forage production system for any farm.
2. Supply the data needed, by recourse to literature, previous experiments, practical experience, or assumption; hence to make known objectives and priorities in research.
3. Train and assist students, advisers, and farmers in the use of these procedures.

A series of spreadsheets was originally developed under Visicalc on the Apple II microcomputer. They are now available on SuperCalc4 and Lotus-1-2-3 for IBM and compatible PC's, and are in widespread use throughout the country, mainly by consultants but also by a few farmers. These spreadsheets, which are collectively known by the name of the central member, FODEL (for fodder planning model), are for use in planning the fodder flow itself, estimating the fodder reserve required, calculating the economic optimum stocking rate for grazing, cash flows and budgets, and various other purposes.

The programme are all of the "what if . . . ?" type and, as such, they can only predict consequences of any set of possibilities presented to them, provided they have been correctly set up for a given property. The programme have been made available mainly to people who attended the short course on fodder planning.

During the past ten years, a large number of short courses (as many as four in a year), have been offered at Cedara and elsewhere, and they were attended by advisers and farmers from all parts of the RSA and neighbouring states.

The course is also offered as part of the syllabus for Cedara Diploma as well as University of Natal B.Sc. students in the Faculty of Agriculture. For several years the University of OFS used to send honours students on these courses. At present, approximately 60 Cedara students and 30 University students a year use the programme for the preparation of their farm plans. Scores of fodder plans have been developed for individual farmers over the report years.

Apart from the overall development of the fodder planning system, two specific developments warrant mention. Firstly, a theory of fodder banking has been built on the probability of rainfall. Secondly, economic theory has been integrated into the biological relationship between animal production and stocking rate as set out by Jones & Sandland in Australia.

The single biggest problem in fodder planning has been that of predicting the annual and monthly yields of forage that can be expected under given conditions of environment and management and research in this field is a major priority. Another high-priority field of research is to build a model that can predict Jones/Sandland relationships for any type of animal on any kind of grazing in any set of conditions. Whereas production curves and yield prediction are basic to broad *planning*, Jones/Sandland relationships are needed to ensure the economic and stable *implementation* of any plan.

N.6211/42/1/6:

DEVELOPMENT OF MICROCOMPUTER PROGRAMS FOR DAIRY HERD MANAGEMENT.
1977-1989

R.I. Jones

Under the title "the CEDARA program", derived from CE^dara DAⁱry RA^tioning programme, a whole suit (matching series) of programmes to deal with the management of dairy animals has been developed to run on the Apple II computer. A user's Manual was compiled and a short course developed to teach farmers and advisers how to run the programme.

The core of the programme is an algorithm based on the principles set out by Bredon & Stewart (1979) in "Feeding and Management of dairy Cattle in Natal", incorporating the latest British Agricultural Research Council standards (1989). American standards, as laid down by the National Research Council, have been used mainly for nutritional standards for dry cows and heifers.

Based on experience and knowledge gained from the development of the 'Blue Book', DAISI programme and early fodder flow programmes, R. Jones (Computer expert) and G. Stewart (Dairy specialist), assisted by other scientists, developed the CEDARA programme to run on a micro-computer.

The CEDARA programme is a whole set of independent menu-driven programmes on three floppy discs. The programmes fall into four broad groups, i.e. herd data management, feeds data management with associated routines, the feeding programmes themselves and a group of odd programmes such as a disc drive speed test and a pasture disc meter manager.

The programme computes the daily requirements of the individual dairy animal for dry matter, total digestible nutrients, digestible crude protein, and calcium and phosphorus. The most influential variables effecting requirements are live mass, daily butterfat yield and condition score, as described by Mulvang (1977). Other factors taken into account in determining daily requirements are age, stage of lactation and stage of pregnancy.

Three main user activities can be identified, i.e. data entry and editing, analysis of animal performance in terms of heifer growth, herd production and herd fertility and the consideration of feeding regimes and associated concentrate allocations. In order to carry out their activities, the farmer is forced to collect certain data to interpret information produced by the computer, look at critical management areas such as fodder flow and composition of concentrates, and then to make decisions. The programme makes it possible for the farmer to compare strategies and can be a powerful aid in decision-making. The nett effect is that the herd management as a whole gets upgraded.

An additional feature of the CEDARA programme is a programme which performs an analysis of fertility by age groups and over the whole herd. Fertility patterns thus established often highlight such management deficiencies as poor rearing of heifers, neglect of dry cows, mineral malnutrition and defective A.I. techniques.

The successful development of a programme, such as the CEDARA programme, is only possible if the computer expert and specialist work closely together, supported by experts in associated fields and, when once operative, be serviced by the specialist and computer expert, so that errors can be corrected, unforeseen situations catered for and adaptations made as conditions change and new technology becomes available.

The CEDARA programme can only be used for determining concentrate requirements of individual cows if the standard of management of the dairy herd is high enough, allowing the necessary records to be kept, required facilities to be available, sufficient palatable roughage and clean drinking water to be available at all times, and her health and breeding policies are of an acceptable standard.

FRUIT FARMING

• *Situation analysis*

N.6214/35/1/1:

SITUATION ANALYSIS OF BANANA FARMERS IN THE PORT SHEPSTONE EXTENSION
WARD. 1983-1986

E.H. Gevers

Most of the some 250 banana producers on the Natal South Coast, within the Port Shepstone Extension Ward, rely solely on bananas for their income. The banana farms are generally small and considered non-viable units for most other forms of agriculture. In spite of relatively poor physical resources in terms of soil and topography, the somewhat marginal subtropical climate allows the economic viability of bananas. However, production was low.

A situation survey was conducted on 60 farms in the area to investigate the major management limitations to banana production, so as to overcome as many as possible.

The management factors investigated were cultivar, plant population, irrigation techniques, fertilisation, desuckering, weed control, mulching, pest and disease control (fruit), pre-plant soil management, bunch covers, soil depth, soil forms, dryland versus irrigation, topography, slope, aspect and wind protection. Each management factor was categorised into various defined (management) levels.

Data analysis showed that bunch mass, gross yield and yield index (nett first grade yield $\text{ha}^{-1} \text{ annum}^{-1}$) were all significantly affected by irrigation technique, desuckering practice and weed control. Bunch mass and gross yield were also significantly affected by fertilisation practice, mulching and topographical position. Bunch mass was also affected by pest and disease control, and by plant population.

The low yields were largely attributable to competition for moisture and nutrients, and also to a lack of attention to the finer points in management, with resultant reduction in fruit quality. The percentage of first grade fruit in the survey ranged from 21,3 %-90,8 %. The latter figure compares well with the remainder of the industry, throughout the country.

The yield index of the survey plots varied from 1,91 t $\text{ha}^{-1} \text{ annum}^{-1}$ (first grade) with a top yield of 44,02 t ha^{-1} (first grade). The average yield index of the survey was 20,54 t ha^{-1} (first grade). Gross yield varied from 15,60 t ha^{-1} to 87,51 t ha^{-1} .

The management factors with the greatest influence on the yield index were found to be sucker management ($r=0,397$), weed control ($r=0,319$), irrigation ($r=0,304$), and wind protection. Wind protection was found to have a significant influence on the growth cycle ($r=0,417$).

Certain vegetative and floral parameters, particular to the Natal South Coast, were also recorded. Bunch mass was correlated ($P < 0,01$) to stem height at flowering ($r=0,550$) to stem circumference (300 mm above the ground level) at flowering ($r=0,736$) to the number of fingers in the third hand of the bunch ($r=0,740$) to the total number of fingers per bunch ($r=0,785$) and to the total number of hands per bunch ($r=0,723$).

The survey identified levels of grower competence, and their perception of their level of competence, particularly with regard to yield, quality and certain management practices. It also identified the need for greater extension inputs into banana management, and indicated that sub-economic plantations should either be improved or withdrawn from production.

SCIENTIFIC ARTICLES
WETENSKAPLIKE ARTIKELS

PLANT PRODUCTION PROMOTION PLANTPRODUKSIEBEVORDERING

AGRONOMY RESEARCH/AKKERBOUNAVORSING

Summer grain/Somergraan

MAIZE/MIELIES

- *Nutrition/Voeding*

- ADRIAANSE, F.G. & HUMAN, J.J., 1990. The effects of nitrate: ammonium ratios and nitrapyrin on the nitrogen response of *Zea Mays* L. under field conditions. *Plant and Soil* 122, 287-293.
- GREYLING, N.B., DU PREEZ, C.C. & HUMAN, J.J., 1990. Netto stikstofmineralisasie in bewerkte en onbewerkte gronde van die mielieproduserende gebiede in Suid-Afrika. *Suid-Afrikaanse Tydskrif vir Plant en Grond* 7, 26-31.
- VAN DER WALT, O.J., VAN ROOYEN, P.J. & VAN DER MEY, G.A., 1990. A comparison of the influence of volumetric versus gravimetric expression of results for advisory purposes and analytical results of soil analysis. *Applied Plant Science* 4, 14-16.

- *Upgrading/Veredelings*

- STANGER, T.K., GEVERS, H.O. & CILLIERS, B., 1990. Application of a model for the identification of maize inbred lines for use in single cross improvement. *South African Journal of Plant and Soil* 7, 142-146.

- *Pests/Plae*

- BATE, J.M., VAN RENSBURG, G.D.J. & GILIOMEE, J.H., 1990. Flight activity pattern of *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae) in the Western Transvaal. *Journal of the Entomological Society of Southern Africa* 53, 109-111.
- BATE, J.M., VAN RENSBURG, G.D.J. & PRINGLE, K.L., 1990. Distribution and occurrence of the stem borer *Chilo partellus* (Swinhoe) on maize in South Africa. *Journal of African Zoology*. (In press).
- BATE, J.J., VAN RENSBURG, G.D.J. & PRINGLE, K.L., 1990. Oviposition site preference by the grain sorghum stem borer *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae) on maize. *Journal of the Entomological Society of Southern Africa* 53, 75-80.
- DRINKWATER, T.W., GILIOMEE, J.H. & PRINGLE, K.L., 1990. The geographical distribution of false wireworms, *Somaticus* species (Coleoptera: Tenebrionidae), associated with maize in South Africa. *Journal of the Entomological Society of Southern Africa* 53, 127-136.
- RHEEDER, J.P., MARASAS, W.F.O., VAN WYK, P.S., DU TOIT, W., PRETORIUS, A.J. & VAN SCHALKWYK, D.J., 1990. Incidence of *Fusarium* and *Diplodia* species and other fungi in naturally infected grain of South African maize cultivars. *Phytophylactica* 22, 97-102.
- VAN DEN BERG, J. & VAN RENSBURG, J.B.J., 1991. Unavoidable losses in insecticidal control of *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae) in maize and grain sorghum. *South African Journal of Plant and Soil* 8, 12-16.
- VAN DEN BERG, J., VAN RENSBURG, J.B.J. & PRINGLE, K.L., 1990. Damage caused by *Chilo partellus* (Swinhoe) (Lepidoptera: Pyralidae) to various cultivars of grain sorghum, *Sorghum bicolor* (L.) Moench. *South African Journal of Plant and Soil* 7, 192-196.
- VAN RENSBURG, G.D.J., 1990. Comparison of chemical control approaches against the maize stalk borer, *Busseola fusca* (Lepidoptera: Noctuidae), in maize in South Africa. *Phytophylactica* 22, 87-91.
- VAN RENSBURG, G.D.J. & GILIOMEE, J.H., 1990. A Comparative of females and males of *Cicadulina nese* and *C. mbila* (Homoptera: Cicadellidae) as vectors of maize streak virus. *Phytophylactica* 22, 241-243.
- VAN RENSBURG, G.D.J., GILIOMEE, J.H. & PINGLE, K.L., 1991. Resistance of South African maize hybrids to maize streak virus. *South African Journal of Plant and Soil* 8, 38-42.
- VAN RENSBURG, J.B.J. & MALAN, C., 1990. Resistance of maize genotypes to the maize stalk borer, *Busseola fusca* (Fuller) (Lepidoptera: Noctuidae). *Journal of the Entomological Society of Southern Africa* 53, 49-55.

VAN RENSBURG, J.B.J. & VAN DEN BERG, J., 1990. Host plant preference by the maize stalk borer, *Busseola fusca* (Fuller) (Lepidoptera: Noctuidae). *South African Journal of Plant and Soil* 7, 117-120.

• *Chemical control/Chemiese beheer*

DRINKWATER, T.W., GILIOMEE, J.H. & PRINGLE, K.L., 1990. Efficacy of soil-applied and seed dressing insecticides for the control of false wireworms, *Somaticus* species (Coleoptera: Tenebrionidae), in maize. *Crop Protection* 9, 128-130.

• *Crop science/Gewaskunde*

HENNING, J.A.G. & STOFFBERG, D.J., 1990. Effek van bewerkingsdiepte op opbrengs en wortelontwikkeling van mielies in 'n Bleeksandserie met 'n watervlak. *Toegepaste Plantwetenskap* 4, 17-20.

LE COURT DE BILLOT, M.R., NEL, P.C. & GEVERS, H.O., 1990. Inheritance of atrazine tolerance in South African maize. *South African Journal of Plant and Soil* 7, 81-86.

THOMAS, P.E.L., 1990. The effect of *Oxalis latifolia* competition in maize. *South African Journal of Plant and Soil*. (In press).

Small grain/Kleingraan

WHEAT/KORING

• *Upgrading/Veredelings*

VAN LILL, D., HOWARD, N.L. & VAN NIEKERK, H.A., 1990. The dough handling properties of two South African wheats with the 1B/1R chromosome translocation. *South African Journal of Plant and Soil* 7(3), 197-200.

VAN LILL, D., WENTZEL, B.S., SMITH, MARIE F. & DE VILLIERS, O.T., 1991. Determination of the effect of protein composition on the bread-making quality of five South African winter wheat cultivars. Congress of the SASCP, University of Stellenbosch, Stellenbosch.

VAN LILL, D., WENTZEL, B.S., SMITH, M. & DE VILLIERS, O.T., 1991. The effect of quantitative protein composition on the bread-making quality of winter wheat cultivars. *Journal of Cereal Science*.

VAN LILL, D., HOWARD, N.L. & VAN NIEKERK, H.A., 1990. The dough handling properties of two South African wheats with the 1B/1R chromosome translocation. *South African Journal of Plant and Soil* 7(3), 197-200.

VAN LILL, D., DRIJEPONDT, S.C. & PRETORIUS, Z.A., 1990. The influence of the leaf rust resistance genes *Lr34* and *LrT3* on the quality characteristics and electrophoretic properties of bread wheat. 20th Congress of the SASCP, Rustenburg.

VAN LILL, D. & VAN NIEKERK, H.A., 1990. Breeding of wheat quality. Paper presented at the National Baking Symposium, Durban.

• *Pathology/Patologie*

DRIJEPONDT, S.C., 1990. Leaf rust survey. Resistance studies. p. 107. In: Annual Wheat Newsletter 36, Colorado State University Press.

DRIJEPONDT, S.C., 1990. Characterization of gene *Lr34* for resistance to leaf rust, *Puccinia recondita* f.sp. *tritici* of wheat. M.Sc. thesis, University of Natal, Pietermaritzburg.

DRIJEPONDT, SéBASTIENNE C., PRETORIUS, Z.A. & RIJKENBERG, F.H.J., 1991. The expression of two wheat leaf rust resistance gene combinations involving *Lr34*. *Plant Disease* 75. (In press).

DRIJEPONDT, SéBASTIENNE C., PRETORIUS, Z.A. & RIJKENBERG, F.H.J., 1991. Effects of growth stage, leaf position and races of *Puccinia recondita* f.sp. *tritici* on *Lr34* resistance in wheat. *Phytophylactica* 23. (In press).

DRIJEPONDT, SéBASTIENNE C. & PRETORIUS, Z.A., 1991. Evaluation of wheat leaf rust resistance gene combinations in segregating populations. *Phytophylactica* (In press).

KEMP, G.H.J., VAN JAARSVELDT, MARYN & LE ROUX, J., 1990. Chemical control of *Gibberella zeae* (Scab of wheat). *Phytophylactica* 22, 147. (Abstract).

KEMP, G.H.J., PRETORIUS, Z.A. & SMITH, J., 1990. Anthracnose of wheat in South Africa. *Phytophylactica* 224, 151. (Abstract).

- PRETORIUS, Z.A., LE ROUX, J. & DRIJEPONDT, S.C., 1990. Occurrence and pathogenicity of *Puccinia recondita* f.sp. *tritici* on wheat in South Africa during 1988. *Phytophylactica* 22, 225-228.
- PRETORIUS, Z.A. & PURCHASE, J.L., 1990. Virulence characteristics of wheat leaf rust in Zimbabwe, Zambia and Malawi. *Phytophylactica* 22, 141-142.
- SCOTT, D.B., 1990. Wheat diseases in South Africa. Department of Agricultural Development, *Technical Communication* No. 220, pp. 1-62.
- SCOTT, D.B. & VAN NIEKERK, H.A., 1991. Resistance in wheat to maize streak virus. *South African Journal of Plant and Soil*.
- SMITH, J. & HATTINGH, M.J., 1990. *Xanthomonas campestris* pv. *translucens* associated with wheat and rye in South Africa. *Phytophylactica* 22, 146 (Abstract).
- SMITH, J., 1990. Bacterial diseases. In: Annual Wheat Newsletter Vol. 36, p. 108.
- SMITH, J., 1990. Bacterial diseases of small grain crops in South Africa. M.Sc. Agric. University of Stellenbosch, Stellenbosch.
- SMITH, J. & HATTINGH, M.J., 1991. Fluorescent *pseudomonads* associated with diseases of wheat in South Africa. *Journal of Phytopathology* (In press).
- SMITH, J. & HATTINGH, M.J., 1991. Pathogenicity and virulence of fluorescent *pseudomonads* on wheat in South Africa. *Phytophylactica* (In press).
- SMITH, J. & HATTINGH, M.J., 1991. Phenotypic characteristics of fluorescent bacteria associated with diseased wheat in South Africa. *Phytophylactica* (In press).

• Pests/ Plae

- PRINSLOO, G.J., 1990. Some aspects of the biology of the Aphidophagous parasitoids *Aphidius colemani* (Viereck) and *Aphelinus asynis* Walker. M.Sc. thesis, University of the Orange Free State, Bloemfontein.

BARLEY/GARS

• Pathology/ Patologie

- SCOTT, D.B., 1990. A qualitative method of evaluating barley cultivars for resistance to *Pyrenophora teres* and *Pyrenophora japonica*. Proceedings of the 4th International Mycological Congress. Regensburg, Germany.
- SCOTT, D.B., 1990. Browning root rot of cereals: Etiological and epidemiological aspects. Proceedings of the 4th International Mycological Congress. Regensburg, Germany.
- SCOTT, D.B., 1990. Reaction of barley cultivars to infection by South African isolates of *Drechslera teres*. *Phytophylactica* 22, 153.
- SCOTT, D.B., 1990. Identity of *Pyrenophora* isolates causing net-type and spot-type lesions on barley. *Mycopathologia*.
- SCOTT, D.B., 1990. Assessment of resistance in barley to *Pyrenophora teres* and *Pyrenophora japonica*. *Phytophylactica*.

OATS/HAWER

• Pathology/ Patologie

- SMITH, J. & HATTINGH, M.J., 1991. *Pseudomonas syringe* pv. *striaefaciens* associated with diseased oats in South Africa. *Phytophylactica* (In press).
- SMITH, J., HATTINGH, M.J. & KEMP, G.H.J., 1990. *Pseudomonas syringe* pv. *striaefaciens* associated with oats in South Africa. *Phytophylactica* 22, 156. (Abstract).

• Pests/ Plae

- DE VILLIERS, B.L. & DU TOIT, D., 1991. Efficacy of fenoxaprop-P-ethyl when applied in combination with bromoxynil and MCPA. *Applied Plant Science* (In press).
- DE VILLIERS, B.L. & DU TOIT, D., 1991. Antagonistic effect of MCPA on *Avena sterilis* control with tralkoxydim. *South African Journal of Plant and Soil* (In review).
- DE VILLIERS, B.L., KNOBEL, H.H., DU TOIT, J.P. & SMIT, H.A., 1991. The influence of combinations of CGA 184927 with an adjuvant, bromoxynil, MCPA and parathion on wild oat (*Avena sterilis*) control. *Applied Plant Science* (In review).

- DE VILLIERS, B.L. & DU TOIT, D., 1991. Impact of DPX L-5300 and bromoxynil combinations on *Avena sterilis* L. control with imazamethabenz-methyl. *Journal of Agronomy and Crop Science* (In review).
- DE VILLIERS, B.L. & DU TOIT, D., 1991. Interactions of four wild oat herbicides with broadleaf herbicide combinations. M.Sc. thesis, U.O.F.S., Bloemfontein.

• *Crop science/Gewaskunde*

- DRIJEPONDT, SÉBASTIENNE C., PRETORIUS, Z.A., VAN LILL, D. & RIJKENBERG, F.H.J., 1990. Effect of *Lr34* resistance on leaf rust development, grain yield and baking quality in wheat. *Plant Breeding* 105, 62-68.
- DRIJEPONDT, S.C. & PRETORIUS, Z.A., 1990. Effects of growth stage and leaf position on *Lr34* resistance to *Puccinia recondita* f.sp. *tritici*. *Phytophylactica* 22, 149. (Abstract).
- KNOBEL, H.H., DE VILLIERS, B.L., SMIT, H.A. & LINDEQUE, R.C., 1991. Die fitotoksisiteit van tralkoksidim, bromoksinil en 'n mengsel van die twee produkte op Suid-Afrikaanse koringcultivars. *Suid-Afrikaanse Tydskrif vir Plant en Grond*.

• *Soil Science/Grondkunde*

- KNOBEL, G.J., KILIAN, W.H. & HUMAN, J.J., 1990 Die invloed van grondsuurheid op koringcultivars met verskillende vlakke van aluminium toleransie. *Plant en Grond*.

Protein and oil seeds/Proteïen-en oliesade

GROUNDNUTS/GRONDBONE

• *Pests/Plae*

- BASSON, S., DE WAELE, D.G.M.A. & MEYER, A.J., 1990. An evaluation of crop plants as hosts for *Ditylenchus destructor* isolated from peanut. *Nematopica* 20, 23-29.

• *Crop science/Gewaskunde*

- VAN DER MERWE, P.J.A., 1990. Die invloed van groeiperiode op die opbrengs en kwaliteit van drie grondbooncultivars. *Toegepaste Plantwetenskap*, Vol. 4(1), 32-35.

SUNFLOWERS/SONNEBLOMME

• *Nutrition/Voeding*

- LOUBSER, H.L., GRIMBEEK, C.L. & BRONKHORST, BEULAH, 1990. Invloed van bemesting op sonneblomme. II. N-, P- en K-verwydering deur die gewas. *Suid-Afrikaanse Tydskrif Plant en Grond* 7(3), 172-175.

Other agronomy crops/Ander akkerbougewasse

COTTON/KATOEN

• *Management/Bestuur*

- VAN HEERDEN, H.G., ROSSOUW, L.J.B. & WELDING, M.C., 1990. Saadkatoenopbrengste en veselgehalte van katoen (*Gossypium hirsutum* L.) onder 'n meerjarige verbouingstelsel. *Toegepaste Plantwetenskappe* 4, 67-69.

- *Technology/Tegnologie*

VAN HEERDEN, H.G., VAN STADEN, W.H. & VAN ARK, H., 1990. The effects of environment on the relationship between cotton fibre properties and their characteristics. *South African Journal of Plant and Soil* 7, 131-135.

TOBACCO/TABAK

- *Pathology/Patologie*

ENGELBRECHT, MARTHIE C., VAN WYK, R.J., ENGELBRECHT, L. LA G. & JANSE VAN RENSBURG, J.N., 1990. Control of bacterial wilt of tobacco with chloropicrin in South Africa. *Phytophylactica* 22, 269-271.

MEYER, J.C., VAN WYK, R.J. & PHILLIPS, A.J.L., 1990. Rhizoctonia leaf spot of tobacco in South Africa. *Plant Pathology* 39, 206-207.

- *Pests/Plae*

VAN HEERDEN, H.G., HOFFMAN-GROBLER, LINDA L., & EISENBERG, B.E., 1991. Effect of isopropalin and metolachlor on flue-cured tobacco transplants. *Applied Plant Sciences* 5, 18-20.

CHICORY/SIGOREI

- *Pathology/Patologie*

PRINSLOO, G.C., BAARD, S.W. & FERREIRA, J.F., 1991. Organisms associated with black root rot of chicory in South Africa. *Phytophylactica* 23, 59-67.

HORTICULTURE RESEARCH/TUINBOUNAVORSING

Pome and stone fruits/Kern- en steenvrugte

APPLES/APPELS

- *Physiology/Fisiologie*

HANSMANN, C.F., 1990. Synthesis and characterisation of methyl2-O-(B-D-glucopyranoside)-6-O-a-l-mannopyranosyl)-a-D-glucopyranoside. *Carbohydrate Research* 204, 221-226.

PRINS, MARINA, 1990. Koolhidraatveranderinge in appelkwekerybome. M.Sc.-thesis, Universiteit van Stellenbosch, Stellenbosch.

VAN EEDEN, S.J., 1990. Ethylene and ACC levels during storage and ripening in avocado, apple and pear fruit. M.Sc. (Agric.), University of Stellenbosch, Stellenbosch.

VAN EEDEN, S.J., 1990. Metaboliese veranderinge in kernvrugte voor oes en tydens opberging, *Proceedings of the Cold Storage Symposium*, 12 September 1990.

- *Pathology/Patologie*

HATTINGH, M.J. & ROOS, I.M.M., 1990. Bacterial canker. In: D.F. Ritchie (Ed.). *Compendium of Stone Fruit Diseases*. American Phytopathological Society, St. Paul, Minnesota. (In press).

HATTINGH, M.J. & ROOS, I.M.M., 1991. Bacterial canker of stone fruits. In: A.N. Mukhopadhyay, U.S., Singh, H.S., Chaube, & J. Kumar (Ed.). *Plant Diseases of International Importance*. New Jersey: Prentice Hall. (In press).

HATTINGH, M.J., ROOS, I.M.M. & MANSVELT, E.L., 1990. Differential interactions between *Pseudomonas syringae* and deciduous fruit trees. pp. 137-138. In: Z. Klement (Ed.). *Plant Pathogenic Bacteria*. Proceedings of the 7th International Conference on Plant Pathogenic Bacteria Budapest, Hungary.

- MANSVELT, E.L. & HATTINGH, M.J., 1990. Bacterial blossom blast. p. 64. *In*: A.L. Jones & H.S. Aldwinckle (Ed.). *Compendium of Apple and Pear Diseases*. American Phytopathological Society, St. Paul, Minnesota.
- MANSVELT, E.L. & HATTINGH, M.J., 1990. Bacterial blister bark. p. 64. *In*: A.L. Jones & H.S. Aldwinckle (Ed.). *Compendium of Apple and Pear Diseases*. American Phytopathological Society, St. Paul, Minnesota.
- MANSVELT, E.L. & HATTINGH, M.J., 1990. Isolation and characterization of bacteriophages of *Pseudomonas syringae*. *Phytophylactica* 22, 154.
- MARASAS, C.N., 1991. Multi plasmids in *Pseudomonas syringae* pv. *morsprunorum* race 1. M.Sc. thesis, University of Stellenbosch, Stellenbosch.

• Pests/ Plae

- BARNES, B.N., 1991. Evaluation of techniques for monitoring emergence of banded fruit weevil, *Phlyctinus collosus*, in deciduous fruit orchards. *Entomologia Experimentalis et Applicata* 60. (In press).
- BARNES, B.N., 1991. Organic farming - can deciduous fruit growers survive the pest onslaught? *Journal of the Southern African Society for Horticultural Science* 1(5), (Supplement).
- BERGH, O., 1990. Cumulative effect of time of hand-thinning on fruit size of Golden Delicious and Granny Smith apples. *Southern African Journal for Plant and Soil*. (In press).
- BERGH, O., 1990. Effect of different day and night temperatures on the diurnal growth rate of terminal and lateral fruits in Golden Delicious apple. *Southern African Journal for Plant and Soil*. (In press).

• Management/ Bestuur

- FOURIE, J.F., 1990. Factors affecting the development of post-harvest decay of fruit. *Proceedings of the Cold Storage Symposium*, 12 September 1990.
- FULLER, K.D. & MOOLMAN, J.H., 1990. Prediction of the redistribution of sprinkler-applied nitrogen in orchard soils. *Proceedings of the Soil Science Society for Southern African Congress*, Pretoria.
- KOTZÉ, W.A.G., 1990. The role of fruit calcium in the maintenance of fruit quality. *Proceedings of the Cold Storage Symposium*, 12 September 1990.
- WOOLDRIDGE, J. & OLIVIER, I., 1990. Effect of phosphate fertilisation on Starking apples and on phosphate sorption in a low-phosphate soil. *Proceedings of the Soil Science for Southern African Congress*, Pretoria.

• Technology/ Tegnologie

- COMBRINK, J.C., 1990. Vrugtetegnologie - Quo Vadis? *Proceedings of the Cold Storage Symposium*, 12 September 1990.
- VAN EEDEN, S.J., DE VRIES, P.J. & CALITZ, F.J., 1990. Optimization of diphenylamine application to control superficial scald of apples. *Proceedings of the Cold Storage Symposium*, 12 September 1990.

PEARS/ PERE

• Pathology/ Patologie

- DE KOCK, S.L., 1990. Blossom end rot of pears: systemic invasion of flowers and immature fruit by *Botrytis cinerea*. M.Sc. (Agric.), University of Stellenbosch, Stellenbosch.
- DE KOCK, S.L., 1990. Ontstaan en beheer van kelkentverrotting by pere. *Proceedings of the Cold Storage Symposium*, 12 September 1990.

• Management/ Bestuur

- COMBRINK, J.C., TRUTER, A.B. & DE VRIES, P.J., 1990. Effek van beheerde atmosferopberging op die kwaliteit van Beurré Bosc pere. *Proceedings of the Cold Storage Symposium*, 12 September 1990.
- SAUNDERS, R.C., JACOBS, G. & STRYDOM, D.K., 1991. Effect of pruning on fruitset and vegetative growth of Packham's Triumph pear trees. *Scientia Horticulturae*. (In press).
- VISAGIE, T.R. & COMBRINK, J.C., 1990. Die nut van gedeeltelike rypmaak van pere voor varsbemarking. *Proceedings of the Cold Storage Symposium*, 12 September 1990.

PEACHES/PERSKES

• Pathology/Patologie

- VON MOLLENDORFF, L.J., DE VILLIERS, O.T. & JACOBS, G., 1990. Development of woolliness in "Flavortop" nectarines. *Proceedings of the 23 International Horticultural Congress*, August 1990, Firenze, Italy.

• Pests/Plae

- BLOMEFIELD, T.L. & GEERTSEMA, H., 1990. First record of the Oriental fruit moth, *Cydia molesta* Lepidoptera: Tortricidae: Olethreutinae), a serious pest of peaches in South Africa. *Phytophylactica* 22, 355-357.

• Crop science/Gewaskunde

- TRUTER, A.B. & COMBRINK, J.C., 1990. Beheerde atmosfeeropberging van steenvurgte. *Proceedings of the Cold Storage Symposium*, 12 September 1990.
- TRUTER, A.B. & DE VRIES, P.J., 1990. Beheer van oppervlakkige brandvlek sonder chemikalieë. *Proceedings of the Cold Storage Symposium*, 12 September 1990.
- VON MOLLENDORFF, L.J., 1991. Post-harvest factors involved in the development of woolliness in nectarines *Prunus persica* Ph.D. thesis, University of Stellenbosch, Stellenbosch.

• Management/Bestuur

- DE VILLIERS, H., CUTTING, J.G.M., JACOBS, G. & STRYDOM, D.K., 1990. The effect of girdling on fruit growth and internal quality of Culemborg peach. *Journal of the Southern African Society for Horticultural Science* 65(2), 151-155.
- HUGO, H.J., 1991. Effect of planting time and nematocides on growth of peach trees in a replant situation. *Journal of the Southern African Society for Horticultural Science*, (In press).
- LINSLEY-NOAKES, G.C., 1990. The effect of winter chilling on bud break and production of three nectarine cultivars in the Western Cape. *Proceedings of the International Society for Horticultural Science Congress*, Italy.
- STADLER, J.D., 1990. Effect of seedling and clonal rootstocks on survival, growth and yield of peach and nectarine cultivars. *Journal of the Southern African Society for Horticultural Science*. (In press).
- VISAGIE, T.R., 1990. Effek van na-oeshantering op kwaliteit van steenvrugte. *Proceedings of the Cold Storage Symposium*, 12 September 1990.

PLUMS/PRUIME

• Pathology/Patologie

- DU PLESSIS, H.J., 1990. Systemic invasion of plum seed and fruit by *Xanthomonas campestris* pv. *pruni* through stalks. In: Plant Pathogenic Bacteria. Ed. Z. Klement, Proceedings of the 7th International Conference on Plant Pathogenic Bacteria. Budapest, Hungary, 11-16. June 1989, p. 123. (Abstract).
- DU PLESSIS, H.J., 1990. Systemic invasion of plum seed and fruit by *Xanthomonas campestris* pv. *pruni* through stalks. *Journal of Phytopathology* 130, 37-45.
- PRETORIUS, E., HATTINGH, M.J. & ROOS, I.M.M., 1990. Cosmid cloning of genomic DNA isolated from *Pseudomonas syringae* pv. *syringae*. Southern African Society for Plant Pathology, University of Pretoria, Pretoria.
- ROOS, I.M.M., HATTINGH, M.J. & MARASAS, C.N., 1990. Transmission of *Pseudomonas syringae* pv. *syringae* by seed of stone fruit trees. In: Plant Pathogenic Bacteria. Ed. Z. Klement, Proceedings of the 7th International Conference on Plant Pathogenic Bacteria, Budapest, Hungary, pp. 161-163.

• Pests/Plae

- NORTH, M.S., STADLER, J.D. & LOTZÉ, G.F.A., 1990. Artificial rest-breaking of plum cultivars using hydrogen cyanamide. *Journal of the Southern African Society for Horticultural Science*. (In press).
- SCHLAGBAUER, H.E. & HOLZ, G., 1990. Infection and colonization of plum blossoms by *Monilinia laxa*. *Phytophylactica* 22, 419-422.

APRICOTS/APPELKOSE

- *Evaluation/Evaluasie*

STADLER, J.D., 1990. Efficacy of some plum and peach rootstocks for apricots. *Journal of the Southern African Society for Horticultural Science*. (In press).

Berry fruits/Bessievrugte

BERRIES/BESSIES

- *Genetics/Genetika*

HUMAN, J.P. & LOUW, J.H., 1990. An analysis of genetic variability in South African strawberry germ plasm. 1. Yield components. *Journal of the Southern African Society for Horticultural Science*. (In press).

HUMAN, J.P. & LOUW, J.H., 1990. An analysis of genetic variability in South African strawberry germ plasm. 2. Quality components. *Journal of the Southern African Society for Horticultural Science*. (In press).

- *Crop science/Gewaskunde*

HUMAN, J.P., 1991. Historical review of strawberry breeding in South Africa. *Applied Plant Science* 5, 42-45.

- *Management/Bestuur*

HUMAN, J.P., 1991. Effect of preplant defoliation on three strawberry cultivars in the South-western Cape. *Applied Plant Science* 5, 10-13.

HUMAN, J.P., 1991. Effect of planting date on the yield and fruit size of three strawberry cultivars in the South-western Cape. *Applied Plant Science* 4, 74-77.

HUMAN, CHRISTINE & KOTZÉ, W.A.G., 1990. Effect of nitrogen and potassium fertilization on strawberries in an annual hill culture system. 2. Soil N and K Levels. *Communications in Soil Science and Plant Analysis* 21, 783-793.

HUMAN, CHRISTINE & KOTZÉ, W.A.G., 1990. Effect of nitrogen and potassium fertilization on strawberries in an annual hill culture system. 3. Leaf nutrient levels. *Communications in Soil Science and Plant Analysis* 21, 795-810.

HUMAN, CHRISTINE & KOTZÉ, W.A.G., 1990. Effect of nitrogen and potassium fertilization on strawberries in an annual hill culture system. 1. Yield and fruit size. *Communications in Soil Science and Plant Analysis* 21, 771-782.

Viticulture/Wingerdbou

TABLE GRAPES/TAFELDRUIWE

- *Pathology/Patologie*

FERREIRA, J.H.S., 1990. In vitro evaluation of epiphytic bacteria from table grapes for suppression of *Botrytis cinerea*. *South African Journal for Enology and Viticulture* 11, 38-41.

- *Pests/Plae*

LAMBERTI, F., VOVLAS, N. & HUGO, H.J., 1990. Damage by *Meloidogyne javanica* on vines in South Africa. *Nematologia Mediterranea* 18, 1-3.

SCHWARTZ, A., 1990. Pesticide effect on populations of *Tetranychus urticae* Koch (Acari: Tetranychidae) and a predaceous mite on table grapes in the Hex River Valley. *South African Journal for Enology and Viticulture* 11, 33-37.

• Physiology/Fisiologie

- HUNTER, J.J. & VISSER, J.H., 1990. The effect of partial defoliation on growth characteristics of *Vitis vinifera* L. cv. Cabernet Sauvignon. I. Vegetative growth. *South African Journal for Enology and Viticulture* 11, 18-25.
- HUNTER, J.J. & VISSER, J.H., 1990. The effect of partial defoliation on growth characteristics of *Vitis vinifera* L. cv. Cabernet Sauvignon. II. Reproductive growth. *South African Journal for Enology and Viticulture* 11, 26-32.

• Nutrition/Voeding

- CONRADIE, W.J., 1990. Distribution and translocation of nitrogen absorbed during late spring by two-year-old grapevines grown in sand culture. *American Journal of Enology and Viticulture* 41, 241-250.

• Pests/Plae

- DE KLERK, C.A., 1990. Diminution des les traitements chimeques dans la lutte contre maladies et les parasites des vignobles. *Proc. 70th General Assembly of the Office International de la Vigne et du Vin sur Protection de l'Environnement dans le secteur Viticole*, Yalta, USSR, Sept. 1990, 1-10.
- HÖPPNER, G.F.J. & FERREIRA, J.H.S., 1990. Fungi associated with the quince borer, *Coryphodema tritis* (Drury) (Lepidoptera: Cossidae) in grapevines. *South African Journal for Enology and Viticulture* 11, 57-59.
- SCHWARTZ, A. & CAPATOS, D., 1990. Evaluation of chemicals for toxicity to brown snail (*Helix aspersa* Müller) on grapevines. *South African Journal for Enology and Viticulture* 11, 55-58.

• Crop science/Gewaskunde

- ARCHER, E. & STRAUSS, H.C., 1990. The effect of vine spacing on some physiological aspects of *Vitis vinifera* L. (cv. pinot noir). *South African Journal for Enology and Viticulture* 11, 76-87.
- SWANEPOEL, J.J., HUNTER, J.J. & ARCHER, E., 1990. The effect of trellis systems on the performance of *Vitis vinifera* L. cv. Sultanina and Chenel in the lower Orange River region. *South African Journal for Enology and Viticulture* 11, 59-66.
- SWANEPOEL, J.J., DE VILLIERS, F.S. & POUGET, R., 1990. Prediction of the date of budburst in grapevines. *South African Journal for Enology and Viticulture* 11, 46-49.
- VAN HUYSSTEEN, L. & CONRADIE, W.J., 1990. The impact on the environment of soil management and fertilization techniques in vineyards with special reference to South African conditions. *Proc. 70th General Assembly of the Office International de la Vigne et du Vin sur Protection de l'Environnement dans le secteur Viticole*, Yalta, USSR, Sept. 1990, 1-16.
- VAN HUYSSTEEN, L., 1990. The effect of soil management and fertilization on grape composition and wine quality with special reference to South African conditions. *Proceedings of the 7th Australian Wine Industry Technical Conference*, Adelaide, South Australia, Aug. 1989, 16-25.

Oenology/Wynkunde

WINE/WYN

• Taxonomy/Taksonomie

- AUGUSTYN, O.P.H., KOCK, J.L.F. & FERREIRA, D., 1990. Differentiation between yeast species and strains within a species, by cellular fatty acid analysis. III. *Saccharomyces sensu lato*, *arxiozyma* and *pachytichospora*. *Systematic and Applied Microbiology* 13, 44-55.
- AUGUSTYN, O.P.H., & KOCK, J.L.F., 1990. Differentiation between strains of *Saccharomyces cerevisiae*, and other yeast species associated with wines, by means of cellular fatty acid analysis. *Proceedings of the 4th Symposium International d'Oenologie*, Bordeaux, France, June 1989, 222-226.

• Chemistry/Chemie

- MARAI, J., VAN WYK, C.J. & RAPP, A., 1990. Carotenoids in grapes. *Proceedings of the 6th International Flavor Conference*, Crete, Greece, July 1989, 71-85.

Citrus and subtropical crops/Sitrus- en subtropiese gewasse

CITRUS/SITRUS

- Pathology/ Patologie

MANICOM, B.Q. & VAN VUUREN, S.P., 1990. Symptoms of greening disease with special emphasis on African greening. *Proceedings of the 4th International Asia Pacific Conference on Citrus Rehabilitation*, pp. 122-131.

- Pests/ Plae

DU TOIT, W.J. & SCHWARTZ, A., 1990. Verbeterde stelsel vir die massateel van valskodlingmot *Cryptophlebia leucotreta* (Lepidoptera: Tortricidae). *Phytophylactica* 22, 135-137.

NETWON, P.J. & ODENDAAL, W.J., 1990. Commercial inundative release of *Trichogrammatidea cryptophlebiae* Hymenoptera Trichogrammatidae in citrus. *Entomophaga* 35(4), 545-556.

VAN DEN BERG, M.A., 1990. The citrus psylla, *Trioza erytreae* (Del Guercio) (Hemiptera: Triozidae): A review. *Agriculture, Ecosystems and Environment* 30, 171-194.

VAN DEN BERG, M.A., BEDFORD, E.C.G. & CILLIERS, CATHARINA J., 1990. Spiny blackfly, *Aleurocanthus spiniferus* (Hemiptera: Aleurodidae), a new pest of citrus in South Africa. *Phytophylactica* 22, 257-258.

VAN DEN BERG, M.A., DEACON, VALERIE E. & DE JAGER, KAREN, 1990. Ecology of the citrus psylla, *Trioza erytreae* (Hemiptera: Triozidae). 1. Daily activities and habits of adults. *Phytophylactica* 22, 323-328.

VAN DEN BERG, M.A., DEACON, VALERIE E. & DE JAGER, KAREN, 1990. Ecology of the citrus psylla, *Trioza erytreae* Hemiptera: Triozidae). 2. Egg hatching and moulting. *Phytophylactica* 22, 329-333.

PINEAPPLE/PYNAPPEL

- Physiology/ Fisiologie

FITCHET-PURNELL, MARIANA, 1990. Organdgenesis in callus cultures of pineapple (*Ananas comosus* (L) Merr). *Acta Horticulturae* 275(1), 267-274.

FITCHET-PURNELL, MARIANA, 1990. Clonal propagation of Queen and Smooth Cayenne pineapples. *Acta Horticulturae* 275(1), 261-266.

- Pests/ Plae

PETTY, G.J., 1990. Effect of endosulfan on leathery pocket disease in pineapples, and evidence for the association of the mite, *Steneotarsonemus ananas* (Acarina: Tarsonemidae) with leathery pocket. *Acta Horticulturae* 275(1), 663-670.

RABIE, ELMARIE C., 1990. Preplant treatment of *Radopholus similis* in infested banana land. *Acta Horticulturae* 275(1), 647-654.

AVOCADO/AVOKADO

- Physiology/ Fisiologie

KOEN, T.J., DU PLESSIS, S.F. & TERBLANCHE, J.H., 1990. Nutritional factors involved in physiological post-harvest fruit disorders of avocado (cv. Fuerte). *Acta Horticulturae* 275(1), 543-550.

- Nutrition/ Voeding

ABERCROMBIE, R.A., 1990. Root distribution of avocado trees on a sandy loam soil as affected by soil compaction. *Acta Horticulturae* 275(1), 505-512.

- *Pests/ Plae*

DU TOIT, W.J. & DE VILLIERS, E.A., 1990. Effects of insect growth regulators on the development of heart-shaped scale (Hemiptera: Coccidae) on avocados in South Africa. *Tests of Agrochemicals and Cultivars* No. 11, 4-5.

BANANA/PIESANG

- *Physiology/ Fisiologie*

FITCHET-PURNELL, MARIANA, 1990. Induction of embryogenic callus from flower shoot tips of Dwarf Cavendish banana. *Acta Horticulturae* 275(1), 275-284.

- *Crop science/ Gewaskunde*

ROBINSON, J.C., 1990. A field comparison of conventional suckers with *in vitro* derived banana planting material in the first crop cycle. *Acta Horticulturae* 275(1), 181-187.

ROBINSON, J.C. & NEL, D.J., 1990. Competitive inhibition of yield potential in a Williams banana plantation due to excessive sucker growth. *Scientia Horticulturae* 43, 225-236.

DIVERSE SUBTROPICAL FRUITS ALLERLEI SUBTROPISCHE VRUGTE

- *Upgrading/ Veredeling*

OOSTHUIZEN, J.H., 1990. Litchi cultivars and selections in South Africa. *Acta Horticulturae* 275(1), 409-416.

DU PREEZ, ROSAMARY J. & WELGEMOED, C.P., 1990. Variability in fruit characteristics of five quava selections. *Acta Horticulturae* 275(1), 351-359.

SNYMAN, J.C., 1990. Mango breeding and selection - past, present and future. *Acta Horticulturae* 275(1), 335-342.

- *Pests/ Plae*

CRAUSE, CHARMAINE, 1990. The white peach scale, *Pseudaulacaspis pentagona* (Targioni-Tozzetti) (Homoptera: Dispididae) a pest of economic importance on granadilla. *Acta Horticulturae* 275(1), 655-662.

NEWTON, P.J. & CRAUSE, CHARMAINE, 1990. Oviposition on *Litchi chinensis* by *Cryptophlebia* species (Lepidoptera: Tortricidae). *Phytophylactica* 22, 365-367.

VAN DEN BERG, M.A. 1990. The African lunar moth, *Argema mimosae* Lepidoptera: Saturniidae), a potential pest of marula. *Acta Horticulturae* 275(1), 685-689.

OTHER SUBTROPICAL CROPS/ANDER SUBTROPISCHE GEWASSE

- *Physiology/ Fisiologie*

FITCHET-PURNELL, MARIANA, 1990. Establishment of *Piper nigrum in vitro*. *Acta Horticulturae* 275(1), 285-291.

- *Nutrition/ Voeding*

VAN LELYVELD, L.J., SMITH, B.L. & FRAZER, CONNIE, 1990. Nitrogen fertilization of tea: effect of chlorophyll and quality parameters of processed black tea. *Acta Horticulturae* 275(1), 483-488.

- *Upgrading/ Veredeling*

SNIJDER, B., 1990. Selection criteria for Robusta coffee (*Coffea canephora*) in South Africa. *Acta Horticulturae* 275(1), 371-374.

- *Pests/Plae*

VAN DER MEULEN, HESTER J. & SCHOEMAN, A.S., 1990. Aspects of the phenology and ecology of the antestia stink bug *Antestiopsis orbitalis* (Hemiptera: Pentatomidae), a pest of coffee. *Phytophylactica* 22(4), 423-426.

- *Crop science/Gewaskunde*

SNIJDER, B., 1990. Plant spacing for *Coffea arabica* in South Africa. *Acta Horticulturae* 275(1), 189-192.

- *Meteorology/Weerkunde*

ANDERSON, T., DU PLESSIS, S.F., NIEMAND, T.R. & SCHOLTZ, A., 1990. Evaporative cooling of ginger (*Zingiber officinale*). *Acta Horticulturae* 275(1), 173-179.

- *Technology/Tegnologie*

GRECH, N.M. & SWARTS, D.F., 1990. Post-harvest application of fungicides for control of fungal decay of ginger rhizomes stored under simulated low-temperature shipping conditions. *Phytophylactica* 22, 457-458.

Sundry horticultural crops/Diverse tuinbougewasse

HORTICULTURAL CROPS/TUINBOUGEWASSE

- *Pathology/Patologie*

SMIT, W.A. & KNOX-DAVIES, P.S., 1990. Comparison of *Diaporthe phaseolorum* isolates from rooibos tea *Aspalathus linearis* (Abstract). *Southern African Society for Plant Pathology Proceedings* 17.

SMIT, W.A. & WINGFIELD, M.J., 1991. Comparison of *Diaporthe phaseolorum* isolates in South Africa (Abstract). *American Phytopathological Science Proceedings*.

PLANT PROTECTION RESEARCH/PLANTBESKERMINGSNAVORSING

Entomology/Zoology/Insektekunde/Dierkunde

INSECTS/INSEKTE

- *Taxonomy/Taksonomie*

EARDLEY, C.D., 1991. The Melectini in subsaharan Africa. *Entomology Memoir*, Department of Agricultural Development, Republic of South Africa, No. 82, 1-49.

EARDLEY, C.D. & SCHWARTZ, M., 1991. The Afrotropical species of *Nomada Scolopi* (Hymenoptera: Anthophoridae). *Phytophylactica* 23, 17-27.

HUBER, J. & PRINSLOO, G.L., 1991. Redescription of *Anaphes nitens* Girault and description of two new species of *Anaphes* (Hymenoptera: Mymaridae), parasites of *Goniapterus scutellatus* Gyllerhal (Coleoptera: Curculionidae) in Tasmania. *Journal of the Australian Entomological Society* 29, 333-341.

PRINSLOO, G.L. & NESER, O.C., 1990. The southern African species of *Archenomus* Howard (Hymenoptera: Aphelinidae) with a key to the species of the world. *Entomology Memoir*, Department of Agricultural Development, Republic of South Africa, No. 79, 1-30.

- *Entomology/Entomologie*

BROWN, H.D., 1990. The locust threat to southern Africa. *In: Locusts and grasshoppers*, Bayer Crop Protection, Leverkusen, pp. 16-19.

- KFIR, R., 1990. Prospects for cultural control of the stalk borers, *Chilo partellus* (Swinhoe) and *Busseola fusca* (Fuller), in summer grain crops in South Africa. *Journal of the Entomological Society of Southern Africa* 53, 41-47.
- KFIR, R., 1990. Parasites of the spotted stalk borer, *Chilo partellus* (Lepidoptera: Pyralidae) in South Africa. *Entomophaga* 35, 403-410.
- KFIR, R. & KIRSTEN, F., 1991. Seasonal abundance of *Cinara cronartii* (Homoptera: Aphididae) and the effect of an introduced parasite, *Pauesia* sp. (Hymenoptera: Aphidiidae). *Journal of Economic Entomology* 84, 76-82.
- MILLAR, I.M., 1990. The aphids (Homoptera: Aphidoidea) of South Africa. *Entomology Memoir*, Department of Agricultural Development, Republic of South Africa, No. 78, 1-105.
- MöHR, J.D., 1990. Life histories and interrelationships of the karoo caterpillar, *Loxosiege frustralis* Zeller (Lepidoptera, Pyralidae) and its parasitoids in relation to the recognition of mortality in field collected material. *Journal of the Entomological Society of Southern Africa* 53, 1-10.
- PRICE, R.E. & BROWN, H.D., 1990. Reproductive performance of the African migratory locust, *Locusta migratoria migratorioides* (Orthoptera: Acrididae), in a cereal crop environment in South Africa. *Bulletin of Entomological Research* 80, 465-472.
- PRINSLOO, G.L., 1991. Commentary on the insect fauna of the lower Kuiseb River, Namib Desert. In: Seely, M.K., ed. Namib Ecology, pp. 67-75. *Transvaal Museum Monograph* No. 7.

• Pollination/ Bestuiwing

- DU TOIT, A.P., 1990. The importance of certain insects as pollinators of sunflower (*Helianthus annuus* L.). *South African Journal of Plant and Soil* 7, 159-162.
- DU TOIT, A.P., 1990. Pollination research: a missing link in subtropical fruit production. *Acta Horticulturae* 275, 239-243.
- DU TOIT, A.P., 1990. Diversity of insects visiting sunflower capitula and their importance as pollinators. In: Anderson & Buys (Ed.). Apimondia Symposium on bees and beekeeping in Southern Africa, 24-26 January 1990, Stellenbosch, pp. 25-28.
- DU TOIT, A.P., 1990. Pollination of almonds in the Transvaal. *Supplement to Journal of the Southern African Society for Horticultural Science* 1, 18.

NEMATODES/AALWURMS

• Taxonomy/ Taksonomie

- MARAIS, M. & HEYNS, J., 1990. Host plant tests with *Meliodogyne partityla* Kleynhans, 1986. *Phytophylactica* 22, 261-262.
- VAN DEN BERG, E., 1990. Two new and one known species of the Tylenchoidea (nemata) from Southern Africa. *Phytophylactica* 22, 23-34.
- VAN DEN BERG, E., 1990. *Hemicriconemoides capensis* sp.n. and a description of males of *Hemicycliophora labiata* Colbran, 1960 and *Criconema sirgeli* Van den Berg & Meyer, 1987 (Nemata: Criconematidae) from South-Africa. *Revue de Nematologie* 13, 361-368.
- VAN DEN BERG, E., PRINSLOO, G.L. & NESER, S., 1990. An unusual host association *Aprostocetus* sp. (Eulophidae), a hymenopterous predator of the nematode *Subanguina mobilis* (Chit & Fisher, 1975) Brzeski, 1981 (Anguinidae). *Phytophylactica* 22, 125-127.

• Physiology/ Fisiologie

- MARAIS, M., 1990. Plantparasitic nematodes in lucerne fields in South Africa. *Phytophylactica* 22, 449-451.

• Nematology/ Nematologie

- MANSELL, M.W. & ASPÖCK, H., 1990. Post-symposium neuropterological excursions. In: Mansell, M.W. & Aspöck, H. Ed. *Advances in Neuropterology*, Berg en Dal, South Africa, 1988. Department of Agricultural Development, Pretoria, pp. 287-298.
- MANSELL, M.W., 1990. Biogeography and relationships of Southern Africa Myrmeleontidae (Neuroptera). In: Mansell, M.W. & Aspöck, H. Ed. *Advances in Neuropterology*. Proceedings of the third International Symposium on Neuropterology, Berg en Dal, South Africa, 1988. Department of Agricultural Development, Pretoria, pp. 181-190.

- MANSELL, M.W., 1990. The Myrmeleontidae of Southern Africa: tribe Palparini. Introduction and description of *Pamares* gen. nov. with four new species. *Journal of the Entomological Society of Southern Africa* 53, 165-189.

MITES/MYTE

• Taxonomy/Taksonomie

- MEYER, M.K.P. (SMITH), 1990. Some new South-African Eriphyidae (Acari: Eriophyoidea), with description of a new genus. *International Journal of Acarology* 16, 89-101.
- MEYER, M.K.P. (SMITH), 1990. A review of species of *Aceria keifer* (Acari: Eriophyidae) associated with *Acacia* spp. *International Journal of Acarology* 16, 149-173.
- MEYER, M.K.P. (SMITH), 1990. On the African species of *Anthocoptes* Nalepa and *Metaculus* Keifer (Acaria: Eriophyidae). *Journal of African Zoology* 104, 557-572.
- MEYER, M.K.P. (SMITH), 1990. African Eriophyoidea: on some related genera: *Neooxycenus* Newkirk & Keifer, *Tegonotus* Nalepa and *Tegolophus* Keifer (Acari: Eriphyidae). *Phytophylactica* 22, 371-386.
- MEYER, M.K.P. (SMITH), 1990. African Eriophyoidea: the genus *Flechtmannia* Keifer, 1979 (Acari: Eriophyidae). *Phytophylactica* 22, 393-396.
- MEYER, M.K.P. (SMITH) & UECKERMANN, E.A., 1990. African Eriophyoidea: the genus *Eptrimerus* Nalepa, 1989 (Acari: Eriophyidae). *Phytophylactica* 22, 387-391.
- MEYER, M.K.P. (SMITH) & UECKERMANN, E.A., 1990. African Eriophyoidea: the genus *Acalitus* Keifer, 1965 (Acari: Eriophyidae). *Phytophylactica* 22, 1-13.
- MEYER, M.K.P. (SMITH) & UECKERMANN, E.A., 1990. African Eriophyoidea: the genus *Colomerus* Newkirk & Keifer, 1971 (Acari: Eriophyidae). *Phytophylactica* 22, 15-22.
- MEYER, M.K.P. (SMITH) & UECKERMANN, E.A., 1990. African Eriophyoidea: the genus *Aculpos* Keifer, 1966 (Acari: Eriophyidae). *Phytophylactica* 22, 159-175.
- MEYER, M.K.P. (SMITH) & UECKERMANN, E.A., 1990. African Eriophyoidea: the genus *Aculus* Keifer, 1959 (Acari: Eriophyidae). *Phytophylactica* 22, 177-188.
- MEYER, M.K.P. (SMITH) & UECKERMANN, E.A., 1990. South African *Aceria* (Acari: Eriophyidae): On species associated with *Rhus* spp. *Phytophylactica* 22, 289-294.
- UECKERMANN, E.A., 1990. South-African *Aceria* (Acari: Eriophyidae): on species associated with plants of the families Acanthaceae and Malvaceae. *Phytophylactica* 22, 295-301.

• Integrated control/Geïntegreerde beheer

- VAN DEN BERG, A.M., DIPPENAAR-SCHOEMAN, A.S. & SCHOONBEE, H.J., 1990. The effect of two pesticides on spiders in South-African cotton fields. *Phytophylactica* 22, 435-441.

SPIDERS/SPINNEKOPPE

• Taxonomy/Taksonomie

- DIPPENAAR-SCHOEMAN, A.S., 1990. A revision of the African spider genus *Seothyra* Purcell (Araneae: Eresidae). *Cimbebasia* 12, 135-160.

• Acarology/Akarologie

- BOTHA, J.H. & SCHOLTZ, A.J., 1990. Further studies on the effect of spider mites (Acari: Tetranychidae) on cotton yields. *Phytophylactica* 22, 77-85.

• Integrated control/Geïntegreerde beheer

- COETZEE, J.H., DIPPENAAR-SCHOEMAN, A.S. & VAN DEN BERG, A., 1990. Spider assemblages on five species of proteaceous plants in the Fynbos biome of South-Africa. *Phytophylactica* 22, 143-447.

HONEY-BEES/HEUNINGBYE

• *Reproduction/Reproduksie*

BUYS, B., 1990. Features of basic reproduction in queens and drones of the Cape bee. *In*: Anderson & Buys (Ed.). Apimondia Symposium on bees and beekeeping in Southern Africa, 24-26 January 1990, Stellenbosch, pp. 106-109.

• *Entomology/Entomologie*

KEETCH, D.P., 1990. South Africa still free from American foulbrood. *South African Bee Journal* 62,3.

• *Management/Bestuur*

JOHANNISMEIER, M.F., 1988. Eucalypt-dependent beekeeping in South Africa. *Proceedings 2nd Australian and International Beekeeping Congress*, 26-26 July 1988, Brisbane, 213-214.

JOHANNISMEIER, M.F., 1990. Variety in commercial honey *In*: Anderson & Buys (Ed.). Apimondia Symposium on bees and beekeeping in Southern Africa, 24-26 January 1990, Stellenbosch, pp. 135-138.

STORED GRAIN/OPGEBERGDE GRAAN

• *Pests/Plae*

JONSSON, M., VILJOEN, J.H., & COETZER, J.J., 1990. Sealing and its effect on dioxide fumigation of maize in a concrete silo bin. *Phytophylactica* 22, 317-322.

Plant pathology and microbiology/Plantsiektekunde en mikrobiologie

FUNGI/SWAMME

• *Taxonomy/Taksonomie*

BAXTER, A.P., 1990. A large bolete from South Africa. *The Mycologist* 4, 91-93.

BAXTER, A.P., ANELICH, R.Y., ROUX, C. & PHILLIPS, A.J.L., 1991. *National collection of fungi : policy and guidelines regarding submission, identification and loan of specimens*. Department of Agricultural Development, Directorate of Agricultural Information, Pretoria, 6 pp.

CROUS, P.W., WINGFIELD, M.J. & KOCH, SUSAN H., 1990. New and interesting record of South African fungi. X. New records of *Eucalyptus* leaf fungi. *South African Journal of Botany* 56, 583-586.

CROUS, P.W., WINGFIELD, M.J. & PHILLIPS, A.J.L., 1991. The genera *Cylindrocladium* and *Cylindrocladiella* in South Africa. (Abstract). *Phytophylactica* 23. (In press).

WATSON, R.T., ANELICH, R. & SCHUTTE, A.L., 1990. Fungi in the gut contents of Namib desert dune Lepismatidae (Thysanura: Insecta). *Madoqua* 17, 53-54.

• *Pathology/Patologie*

BOTHA, W.J. & CROUSE, P.W., 1991. A wilt disease of azaleas caused by *Pythium prolatum* and *Cylindrocladium scoparium* (Abstract). *Phytophylactica* 23. (In press).

BOTHA, W.J., EICKER, A. & DE MEILLON, S., 1990. A comparative physiological study of four weed moulds of *Agaricus bisporus* mushroom compost. *Phytophylactica* 22, 219-223.

MEYER, J.C., VAN WYK, R.J. & PHILLIPS, A.J.L., 1990. Rhizoctonia leaf spot of tobacco in South Africa. *Plant Pathology* 39, 206-207.

PHILLIPS, A.J.L., 1991. Phototropism in apothecial tips of *Sclerotinia sclerotiorum*. (Abstract). *Phytophylactica* 23. (In press).

PHILLIPS, A.J.L., 1991. Application of fungicides to seeds by solvent infusion. (Abstract). *Phytophylactica* 23. (In press).

PHILLIPS, A.J.L., 1990. Evaluation of tolclofos-methyl and some other fungicidal seed treatments against Rhizoctonia diseases of beans. Tests of Agrochemicals and Cultivars No. 11 *Annals of Applied Biology* 116, (Supplement), pp. 40-41.

- PHILLIPS, A.J.L., 1990. The effects of soil solarization on sclerotial populations of *Sclerotinia sclerotiorum*. *Plant Pathology* 39, 38-43.
- PHILLIPS, A.J.L., 1990. Variation in virulence to dry beans, soybeans and maize among isolates of *Rhizoctonia solani* from beans. *Annals of Applied Biology* 118. (In press).

BACTERIA/BAKTERIEë

• Taxonomy/Taksonomie

- ROUX, CECILIA., COETZEE, J. & VAN WARMELO, K.T., 1990. Ontogeny of conidiomata and conidia in *Tiarospora graminis* var. *karoo*. *Mycological Research* 94, 254-262.
- SWART, W.J., WINGFIELD, M.J. & BAXTER, A.P., 1990. First report of *Discula platani* on plane trees in South Africa. *Phytophylactica* 22, 143-144.

• Nitrogen fixation/Stikstofbinding

- LAW, I.J., KRIEL, M.M., & STRYDOM, B.W., 1990. Differences in the distribution of mannose- and galactose-binding lectins in peanut tissues. *Plant Science* 71, 129-135.
- LAW, I.J., HAYLETT, T., MORT, A.J. & STRYDOM, B.W., 1991. Comparison of galactose-binding lectins from nodules and other tissues of peanut. In: Nitrogen fixation: Achievements and objectives. P.M. Gresshoff, L. Evans Roth, G. Stacey & E. Newton (Ed.). New York: Chapman and Hall.

VIRUSES/VIRUSSE

• Virology/Virologie

- PETERSEN G., & GARNETT, H.M., 1990. A survey for the viruses of soybeans (*Glycine Max*) in the Transvaal, South Africa. *Phytophylactica* 22, 35-40.

PLANT DISEASES/PLANTSIEKTES

• Pathology/Patologie

- KOCH, SUSAN H., 1991. Anthracnose of almonds in the western Cape Province. (Abstract). *Phytophylactica* 23. (In press).
- LAMBRECHT, S.C., MARASAS, W.F.O., KNOX-DAVIES, P.S. & CALITZ, F.J., 1990. Incidence of *Fusarium* species in different cropping systems of annual *Medicago* species and wheat. *Phytophylactica* 22, 69-76.
- LAMBRECHT, S.C., MARASAS, W.F.O., KNOX-DAVIES, P.S. & CALITZ, F.J., 1990. Seed treatment and cultivar reaction of annual *Medicago* species and wheat to *Fusarium avenaceum* and *Fusarium graminearum* Gr. 1 species in different cropping systems of annual *Medicago* species and wheat. *Phytophylactica* 22, 201-208.
- LAMBRECHT, S.C., MARASSAS, W.F.O., KNOX-DAVIES, P.S. & CALITZ, F.J., 1990. Cross-pathogenicity of *Fusarium avenaceum* and *Fusarium graminearum* Gr. 1. to *Medicago truncatula* and wheat. *Phytophylactica* 22, 209-211.

FOREST AND TIMBER/BOSBOOME EN TIMMERHOUT

• Pathology/Patologie

- CROUS, P.W., WINGFIELD, M.J. & SWART, W.J., 1990. Shoot and needle diseases of *Pinus* spp. in South Africa. *South African Forestry Journal* 154, 60-66.
- KEMP, G.H.J., WINGFIELD, M.J., DU PLESSIS, J.W.J. & CROUS, P.W., 1991. A new cancer disease of *Eucalyptus grandis*. (Abstract). *Phytophylactica* 23. (In press).

• *Pests/Plae*

- TRIBE, G.D., 1990. Phenology of *Pinus radiata* log colonization by the pine bark beetle, *Hylastes angustatus* (Herbst) (Coleoptera, Scolytidae) in the south-western Cape Province. *Journal of the Entomological Society of Southern Africa* 53, 93-100.
- TRIBE, G.D., 1990. Phenology of *Pinus radiata* log colonization and reproduction by the European bark beetle *Orthotomicus erosus* (Wollaston) (Coleoptera, Scolytidae) in the south-western Cape Province. *Journal of the Entomological Society of Southern Africa* 53, 117-126.
- TRIBE, G.D., 1990. Biological control of the Eucalyptus nectar fly *Drosophila flavohirta* Malloch. In: Anderson & Buys, Ed. Apimondia Symposium on bees and beekeeping in Southern Africa, 24-26 January 1990, Stellenbosch, pp. 144-147.

Weed research/Onkruidnavorsing

WEEDS/ONKRUIDE

• *Chemical control/Chemiese beheer*

- CAMPBELL, P.L., BELL, R.S. & KLUGE, R.L., 1990. Identifying the research requirements for the control of silver wattle (*Acacia dealbata*) in Natal. *South African Forestry Journal* 155, 37-41.
- CAMPBELL, P.L. & VAN STADEN, J., 1990. Utilisation of solasodine from fruits for long-term control of *Solanum mauritianum*. *South African Forestry Journal* 155, 57-60.

• *Biological control/Biologiese beheer*

- CILLIERS, C.J., 1989. Biological control of aquatic weeds in South Africa - an interim report. *Proceedings of the VII International Symposium on Biological Control of Weeds*, 6-11 March 1988, Rome, Italy, Delfosse, E.S. (Ed.). pp. 263-267.
- DENNILL, G.B. & MORAN, V.C., 1989. On insect-plant associations in agriculture and the selection of agents for weed biocontrol. *Annals of Applied Biology* 114, 157-166.
- DENNILL, G.B., 1989. Why a gall former can be a good biocontrol agent: the gall wasp *Trichilogaster acaciaelongifoliae* and the weed *Acacia longifolia*. *Ecological Entomology* 13, 1-9.
- DENNILL, G.B. & GORDON, A.J., 1990. Climate-related differences in the efficacy of the Australian gall wasp (Hymenoptera: Pteromalidae) released for the control of *Acacia longifolia* in South Africa. *Environmental Entomology* 19, 130-136.
- DONNELLY, D. & STEWART, K., 1990. An indigenous tortricid moth on the seeds of the alien weed *Acacia cyclops* in South Africa: a potential for biocontrol. *Journal of the Entomological Society of Southern Africa* 2, 201-202.
- HOFFMANN, J.H. & ZIMMERMANN, H.G., 1989. Ovipositional and feeding habits in cactophagous psyllids: predictions for biological control of cactus weeds in Southern Africa. *Proceedings of the VII International Symposium on Biological Control of Weeds*, 6-11 March 1988, Rome, Italy, Delfosse, E.S. (Ed.). 1st Sper. Patol. Veg. (MAF), pp. 395-399.
- KLUGE, R.L., 1989. The seed-attacking wasp *Bruchophagus* sp. (Hymenoptera: Eurytomidae) and its potential for biological control of *Acacia longifolia* in South Africa. *Proceedings of the VII International Symposium on Biological Control of Weeds*, 6-11 March 1988, Rome, Italy, Delfosse, E.S. (Ed.). pp. 349-356.
- KLUGE, R.L., 1990. *Klugeana philoxalis* Geertsema (Noctuidae: Cuculliinae), the first potential biological control agent for the weed *Oxalis pes-caprae* L. *Journal of the Entomological Society of Southern Africa* 53, 191-198.
- KLUGE, R.L., 1990. Prospects for the biological control of trifid weed, *Chromolaena odorata*, in Southern Africa. *Journal of Science* 86, 229-230.
- MORRIS, M.J., 1990. *Cercospora piaropi* recorded on the aquatic weed, *Eichhornia crassipes*, in South Africa. *Phytophylactica* 22, 255-256.
- NESER, S. & CILLIERS, C.J., 1989. Work towards biological control of *Lantana camara*: perspectives. *Proceedings of the VII International Symposium on Biological Control of Weeds*, 6-11 March 1988, Rome, Italy, Delfosse, E.S. (Ed.). pp. 363-369.
- NESER, S., ZIMMERMANN, H.G., ERB, H.E. & HOFFMANN, J.H., 1989. Progress and prospects for the biological control of two *Solanum* weeds in South Africa. *Proceedings of the VII International Symposium on Biological Control of Weeds*, 6-11 March 1988, Rome, Italy, Delfosse, E.S. (Ed.). pp. 371-381.

- PIETERSE, P.J. & CAIRNS, A.L.P., 1990. Investigations on the removal by animals of *Acacia longifolia* (Fabaceae) seeds from the soil surface at Banhoek in the south-western Cape. *South African Journal of Plant and Soil* 7, 155-157.
- ZIMMERMANN, H.G., 1989. The utilisation of an invader cactus weed as part of an integrated control approach. *Proceedings of the VII International Symposium on Biological Control of Weeds*, 6-11 March 1988, Rome, Italy, Delfosse, E.S. (Ed.).

PESTICIDES/PLAAGDODERS

• Physiology/Fisiologie

- JORDAAN, L.M., MEINHARDT, H.R. & VAN DYK, L.P., 1990. Threshold concentrations of 2,4-D acid or 2,4-D dimethylamine for causing morphological changes in tomato seedlings. *Applied Plant Science* 5, 14-17.
- VAN RENSBURG, E. & BREEZE, V.G., 1990. Vapour effects of 2,4-Dichlorophenoxyacetic acid derivatives on seed germination of two field crops. *Seed Science and Technology* 18, 577-580.
- VAN RENSBURG, E. & BREEZE, V.G., 1990. Uptake and development of phytotoxicity following exposure to vapour of the herbicide ¹⁴C 2,4-D butyl by tomato and lettuce plants. *Environmental and Experimental Botany* 30, 405-414.
- VAN RENSBURG, E., VAN DYK, L.P., & DE SWARDT, G.H., 1990. Role of temperature and water potential on the activity of some acetanilide herbicides on three *Phaseolus* taxa. *South African Journal of Plant and Soil* 7, 113-116.
- VAN RENSBURG, E., VAN DYK, L.P. & DE SWARDT, G.H., 1990. The effect of acetanilide herbicides on photosynthesis and respiration is isolated hypocotyl epicotyl cells from three *Phaseolus* taxa. *South African Journal of Plant and Soil* 7, 176-181.
- WASSERMANN, V.D. & VAN DEN BERG, M., 1990. Comparative response of lucerne (*Medicago sativa* L.) and sainfoin (*Onobrychis viciaefolia* Scop.) to applications of P,K and lime. *South African Journal of Plant and Soil* 7, 76-80.

ANIMAL PRODUCTION PROMOTION DIEREPRODUKSIEBEVORDERING

ANIMAL PRODUCTION AND ANIMAL PRODUCTS RESEARCH DIEREPRODUKSIE- EN DIEREPRODUKTENAVORSING

Animal production/Diereproduksie

BEEF CATTLE/VLEISBEESTE

- *Norm studies/ Normstudies*

DE BRUYN, J.F., NAUDZé, R.T., HOFMEYR, J.H., BOK, W., VERMEULEN, J.A. & BASSON, M.C., 1990. Quantitive and qualitative aspects of beef production by some beef cattle breeds in the RSA. *Proceedings of the 5th Santa Gertrudis World Congress*, 15-24 April 1990, South Africa.

MUTTON SHEEP/VLEISSKAPE

- *Management/ Bestuur*

STRYDOM, P.E., DE BRUYN, J.F., NAUDé, R.T., KRUGER, G.E. & VAN HEERDEN, S.M., 1990. The application of anabolic growth promoters for sheep under intensive feedlot conditions. *Proceedings 6th Meat Symposium*, 25 April 1990, Meat Science Centre, Animal and Dairy Science Research Institute, Irene, Republic of South Africa, 53-59.

WOOLLED SHEEP/WOLSKAPE

- *Upgrading/ Veredelings*

DELPORT, G.J., 1990. The impact of livestock improvement on the woolled sheep industry. *Proceedings of the South African Society for Animal Production Congress*, 26-28 March 1991, Port Elizabeth.

ERASMUS, G.J., DE LANGE, A.O., DELPORT, G.J. & OLIVIER J.J., 1990. Genetic and phenotypic parameter estimates of Merino sheep in an arid environment. *South African Journal of Animal Science* 20(1), 31-34.

DELPORT, G.J., 1990. What's up with performance testing. *Karoo Streeksnuusbrief* No. 2.

PIGS/VARKE

- *Nutrition/ Voeding*

BRAND, T.S., BADENHORST, H.A., SIEBRITS, F.K. & HAYES, J.P., 1990. The use of pigs both intact and with ileo-rectal anastomosis to estimate the apparent and true digestibility of amino acids in untreated, heat-treated and thermal-ammoniated high-tannin grain sorghum. *South African Journal of Animal Science* 20, 223-228.

BRAND, T.S., BADENHORST, H.A., RAS, M.N., SIEBRITS, F.K., KEMM, E.H. & HAYES, J.P., 1990. Normal and hetero-yellow endosperm grain sorghum as substitute for maize in pig diets. *South African Journal of Animal Science* 20, 229-233.

KEMM, E.H., SIEBRITS, F.K. & BARNES, P.M., 1990. A note on the effect of dietary protein concentration, sex, type and live weight on whole-body amino acid composition of the growing pig. *Animal Production* 51, 631-634.

CHICKENS/HOENDERS

- *Nutrition/ Voeding*

OLVER, M.D., 1990. Quantitative feed restriction during the rearing period of Pekin breeder ducks. VIII European Poultry Conference, Barcelona, Spain.

Animal products/Diereprodukte

MEAT/VLEIS

- Norm studies/Normstudies

- CASEY, N.H., SWANEPOEL, J., DE BRUYN, J.F. & NAUDÉ, R.T., 1990. Meat studies of indigenous South African cattle. II. Textural evaluation of ribcut samples from carcasses of Afrikaner, Nguni and Pedi bulls fed intensively. *South African Journal of Animal Science* 20(4), 188-192.
- DE BRUYN, J.F., 1991. Production and product characteristics of different cattle genotypes under feedlot conditions. D.Sc. (Agric.) thesis, University of Pretoria, Pretoria.
- DE BRUYN, J.F., NAUDÉ, R.T., HOFMEYER, BOK, W., VERMEULEN, J.A. & BASSON, M.C., 1990. Production and product characteristics of different cattle genotypes. *Proceedings 6th Meat Symposium*, 25 April 1990, Meat Science Centre, Animal and Dairy Science Research Institute, Irene, Republic of South Africa, 41-51.
- HEINZE, P.H., 1990. Electrical stimulation and meat quality. *Proceedings 6th Meat Symposium*, 25 April 1990, Meat Science Centre, Animal and Dairy Science Research Institute, Irene, Republic of South Africa, 93-102.
- NORTJÉ, G.L., NEL, L., JORDAAN, E., BADENHORST, K., GOEDHART, G., HOLZAPFEL, W.H. & GRIMBEEK, R.J., 1990. The influence of incubation temperature on bacterial counts in a meat production system. *Journal of Food Protein* 53(5), 418-422.
- NORTJÉ, G.L., NEL, L., JORDAAN, E., BADENHORST, K., GOEDHART, G., HOLZAPFEL, W.H. & GRIMBEEK, R.J., 1990. A quantitative survey of a meat production chain to determine the partial contribution of each link to the microbial profile of the final product. *Journal of Food Protein* 53(5), 411-417.
- NORTJÉ, G.L., NEL, L., JORDAAN, E., BADENHORST, K., GOEDHART, G. & HOLZAPFEL, W.H., 1990. The aerobic psychrotrophic populations on meat and meat contact surfaces in a meat production system and on meat stored at chill temperatures. *Journal of Applied Bacteriology* 68, 335-344.
- SCHOLTZ, E.M., 1990. Wholesale and retail packaging systems in the South African meat industry. *Proceedings 6th Meat Symposium*, 25 April 1990, Meat Science Centre, Animal and Dairy Science Research Institute, Irene, Republic of South Africa, 105-144.
- SCHÖNFELDT, H.C., NAUDÉ, R.T., BOSHOFF, E., VAN HEERDEN, S.M., BOK, W., SMIT, M.C. & SOWDEN, L.S., 1990. A comparison of the quality characteristics of goat and sheep meat. *Proceedings 6th Meat Symposium*, 25 April 1990, Meat Science Centre, Animal and Dairy Science Research Institute, Irene, Republic of South Africa, 117-125.
- SWANEPOEL, J., CASEY, N.H., DE BRUYN, J.F. & NAUDÉ, R.T., 1990. Meat studies of indigenous South African cattle. I. Growth performance and carcass characteristics of Afrikaner, Nguni and Pedi bulls fed intensively. *South African Journal of Animal Science* 20(4), 180-187.
- VAN DEN HEEVER, L.W., SMIT, M.C. & HEINZE, P.H., 1990. Kollageen in boerewors as maatstawwe van gehalte. *Journal of the South African Veterinary Association* 61(2), 59-61.

MILK/MELK

- Microbiology/Mikrobiologie

- KOUTZAYIOTIS, C., 1990. Die voorkoms en belangrikheid van biofilms in melkpypleidings in die suiwelbedryf. M.Sc. (Mikroboil.) P.U. vir C.H.O., Potchefstroom.
- WESSELS, D., JOOSTE, P.J. & MOSTERT, J.F., 1990. Technologically important characteristics of *Enterococcus* isolates from milk and dairy products. *International Journal of Food Microbiology* 10, 349-352.

- Technology/Tegnologie

- SWART, G.J., JOOSTE, P.J. & MOSTERT, J.F., 1990. Species identification and some physiological characteristics of Gram-negative psychrotrophic isolates from raw silo milk. *South African Journal of Dairy Science* 22, 31-36.

- Chemistry/Chemie

- DE LANGE, D.J., MEYER, E.H.H., VAN RENSBURG, L. & SWANEPOEL, A., 1990. The polymorphic protein systems in cow's milk: I. The association with the production of milk protein and fat during lactation. *South African Journal of Dairy Science* 22, 67-72.

- KELLER, J.J. & JORDAAN, H.F. DU P., 1990. Fermented milk for the South African market. *South African journal of Dairy Science* 22, 47-49.
- VAN RENSBURG, L., DE LANGE, D.J. & GINDRA, A., 1990. The polymorphic protein systems in cow's milk. II. The phenotype frequencies of whey protein in different herds of Holstein-Friesian, Jersey and Ayrshire cows in the Republic of South Africa. *South African Journal of Dairy Science* 22, 77-80.

WOOL/WOL

• Norm studies/ Normstudies

- DELPORT, G.J., KOTZE, A.W.D. & WATERMEYER, A.J., 1990. A quarter of a century of fleece testing in South Africa. Proceedings World Merino Conference, 2-4 May 1990, Pretoria, Vol. 2, Paper No. 8.
- DELPORT, G.J., KOTZE, A.W.D. & WATERMEYER, A.J., 1990. Production trends in the South African Merino industry. Proceedings of the World Merino Conference, 2-4 May 1990, Pretoria, Vol. 2, Paper No. 9.
- KOTZE, A.W.D., DELPORT, G.J. & WATERMEYER, A.J., 1990. Differences in the Duerden ratio of Merino types. Proceedings of the World Merino Conference, 2-4 May 1990, Pretoria, Vol. 2, Paper No. 10.

Supporting animal research Ondersteunende dierenavorsing

ANIMALS/DIERE

• Nutrition/ Voeding

- BERGER, E., JONES, W.A., JONES, D.T. & WOODS, D.R., 1990. Sequencing and expression of a cellodextrinase (ced 1) gene from *Butyrivibrio fibrisolvens* H17c cloned in *Escherichia coli*. *Molecular General Genetics* 223, 310-318.
- CRONJÉ, P.B., 1990. Supplementary feeding in ruminants - a physiological approach. *South African Journal of Animal Science* 20, 111-117.
- CRONJÉ, P.B. & OBERHOLZER, E., 1990. Calcium soap: a potential energy supplement for the grazing ruminant. In: Research Developments in Ruminant Nutrition. Ed. D. Swart, pp. 3-9. Technical Communication No 223, Department of Agricultural Development, Republic of South Africa.
- CRONJÉ, P.B. & WEITES, E., 1990. Live mass, carcass and wool growth responses to supplementation of a roughage diet with sources of protein and energy in South African Mutton Merino lambs. *South African Journal of Animal Science* 20, 161-168.
- CRUYWAGEN, C.W., BRISSON, G.J., TREMBLAY, G.F. & MEISSNER, H.M., 1990. Effect of curd suppression in a milk replacer on physiological parameters in calves. 1. Digestibility of nutrients and body mass gain. *South African Journal of Animal Science* 20, 234-238.
- CRUYWAGEN, C.W., BRISSON, G.J., TREMBLAY, G.F. & MEISSNER, H.M., 1990. Effect of curd suppression in a milk replacer on physiological parameters in calves. 2. Selected blood profiles. *South African Journal of Animal Science* 20, 239-243.
- CRUYWAGEN, C.W., BRISSON, G.J. & MEISSNER, H.M., 1990. Casein curd-forming ability and abomasal retention of milk replacer components in young calves. *Journal of Dairy Science* 73, 1578-1585.
- ERASMUS, L.J., 1990. The current status of protein evaluation (review). *South African Journal of Animal Science* 20, 43-51.
- ERASMUS, L.J., 1990. Recent advances in dairy cattle nutrition In: Research Developments in Ruminant Nutrition. Ed. D. Swart, pp. 11-20. Technical Communication No. 223, Department of Agricultural Development, Republic of South Africa.
- ERASMUS, L.J., BOTHA, P.M., LEBZIEN, P. & MEISSNER, H.H., 1990. Composition and intestinal digestibility of rumen fermented feeds and duodenal digesta in cows using bug techniques. *Journal of Dairy Science* 73, 3494-3501.
- ERASMUS, L.J., PRINSLOO, J. & BOTHA, P.M., 1990. Establishment of a ruminal protein degradation data base for dairy cattle using the *in situ* polyester bag technique. 2. Energy sources. *South African Journal of Animal Science* 20, 124-129.
- ERASMUS, L.J., PRINSLOO, J. & BOTHA, P.M., 1990. Establishment of a ruminal protein degradation data base for dairy cattle using the *in situ* polyester bag technique. 3. Roughages. *South African Journal of Animal Science* 20, 130-135.

- HENNING, P.H., 1990. The role of rumen microbial growth efficiency in protein nutrition of ruminants. *In: Research Developments in Ruminant Nutrition*. Ed. D. Swart, pp. 21-30. Technical Communication No. 223, Department of Agricultural Development, Republic of South Africa.
- KISTNER, A. & KORNELIUS, J.H., 1990. A small-scale, three-vessel, continuous culture system for quantitative studies of plant fibre degradation by anaerobic bacteria. *Microbiological Methods* 12, 173-182.
- LININGTON, M.J., 1990. The use of Sanga cattle in beef production. *In: Research Developments in Ruminant Nutrition*. Ed. D. Swart, pp. 31-38. Technical Communication No. 233, Department of Agricultural Development, Republic of South Africa.
- MEESKE, R., 1990. Upgrading of low quality roughages by ammoniation. *In: Research Development in Ruminant Nutrition*. Ed. D. Swart, pp. 39-46. Technical Communication No. 223, Department of Agricultural Development, Republic of South Africa.
- MEESKE, R., 1990. An evaluation of alkaline hydrogen peroxide for the upgrading of wheat straw. M.Sc. thesis, University of Pretoria, Pretoria.
- MEYER, J.H.F., 1990. New systems proposed for describing the protein requirements of sheep. Ed. D. Swart, pp. 47-52. Technical Communication No. 233, Department of Agricultural Development, Republic of South Africa.
- MORRISON, M., MACKIE, R.I. & KISTNER, A., 1990. 3-Phenylpropanoic acid improves the affinity of *Ruminococcus albus* for cellulose in continuous culture. *Applied Environmental Microbiology* 56, 2110-2222.
- MORRISON, M., MACKIE, R.I. & KISTNER, A., 1990. Evidence that cellololysis by an anaerobic ruminal fungus is catabolite regulated by glucose, cellobiose and soluble starch. *Applied Environmental Microbiology* 56, 3227-3229.
- PIENAAR, J.P., ROUX, C.Z. & KUHN, G.P., 1990. Effect of starch fermentation in the rumen on voluntary intake of roughage and kinetics of digestion. *South African Journal of Animal Science* 20, 207-215.
- PIENAAR, J.P. & ROUX, C.Z., 1990. A perspective on the prediction of voluntary feed intake for ruminants. *In: Research Developments in Ruminant Nutrition*. Ed. D. Swart, pp. 53-61. Technical Communication No. 233, Department of Agricultural Development, Republic of South Africa.
- SHELVER, G.D., KERNICK, B.L. & KISTNER, A., 1990. Prospects for advances in ruminant nutrition based on the application of modern biotechnology. *In: Research Developments in Ruminant Nutrition*. Ed. D. Swart, pp. 63-69. Technical Communication No. 223, Department of Agricultural Development, Republic of South Africa.
- SHELVER, C.D., McKAY, G., KISTNER, A. & BAECKER, A.A.W., 1990. Comparison of degradation patterns produced by *Ruminococcus* species on maize cell walls during continuous culture. *Proceedings of the Electron Microscopy Society of Southern Africa* 20, 107-108.
- SLABBERT, N., 1990. The influence of diet energy concentration on level of nutrition on growth and efficiency of beef steers. M.Sc. thesis, University of Pretoria, Pretoria.
- SLABBERT, N., 1990. Nutritional manipulation of growth to produce beef carcasses of a desired composition. *In: Research Developments in Ruminant Nutrition*. Ed. D. Swart, pp. 71-83. Technical Communication No. 223, Department of Agricultural Development, Republic of South Africa.
- VAN DER WALT, J.G. & LININGTON, M.J., 1990. A review of energy metabolism in producing ruminants. *South African Journal of the Veterinary Association* 60, 223.
- VAN DER WALT, J.G., MEYER, J.H.F. & VAN RENSBURG, J.B.J., 1990. Ileo-rectal anastomosis as a model of digestion studies in sheep: effect on water, acid/base, electrolyte and energy balance of the whole animal, as well as on the anatomy of the digestive tract. *Animal Production* 50, 277.
- VAN DER WALT, J.G., MEYER, J.H.F. & VAN RENSBURG, I.B.J., 1990. Ileo-rectal anastomosis as a viable model to protein digestion studies in sheep: effect on feed intake, on water and acid/base balance and on digestive tract anatomy. *Acta Veterinaria Scandinavica*. (Suppl.) 86, 232.
- WESTLAKE, K. MACKIE, R.I. & DUTTON, M., 1989. In vitro metabolism of mycotoxins by bacterial, protozoal and ovine bruminal fluid preparations. *Animal Feed Science and Technology* 25, 169.
- WESTLAKE, K. & MACKIE, R.I., 1990. Peptide and amino acid transport in *Streptococcus bovis*. *Applied Microbiology and Biotechnology* 32, 234.

• Genetics/Genetika

- MEYER, E.H.H., NEL, N.D., HARRIS, E.J. & WIERMANS, J.E., 1990. Die 1/29 chromosomale translokasie in beeste. *Suid-Afrikaanse Tydskrif vir Natuurwetenskap en Tegnologie* 9, 45.
- DE LANGE, D.H., MEYER, E.H.H., VAN RENSBURG, L. & SWANEPOEL, A., 1990. The polymorphic protein systems in milk. I. The association with the production of milk protein and fat during lactation in an experimanetal Friesian herd. *South African Journal of Dairy Science* 22, 67-71.
- DU PLESSIS, J.L., MEYER, E.H.H. & VAN GAS, L., 1990. An attempt to establish an inbred line of mice genetically resistant to *Cowdria ruminantium*. *Onderstepoort Journal of Veterinary Research* 57, 283-285.

- MEYER, E.H.H., REID, G. & HOFMEYR, J.H., 1991. Genetic distance estimates between cattle breeds in Southern Africa - consequences on genetic stability of synthetic composites. *Proceedings of the Annual Conference of the German Genetic Society, Berlin, 17-23 March. 1991*, 136.
- ROUX, C.Z., 1990. Feeder-breeder dimorphism and reproduction in maximum herd efficiency for meat production. *Proceedings of the 4th World Congress on Genetics Applied to Livestock Production* 15, 73-76.
- SCHOLTZ, M.M., ROUX, C.Z., DE BRUIN, D.S. & SCHOEMAN, S.J., 1990. Heritability of parameters of the allometric-autoregressive model and its correlation with common growth and efficiency traits. *South African Journal of Animal Science* 20, 52-56.
- SCHOLTZ, M.M., ROUX, C.Z., DE BRUIN, D.S. & SCHOEMAN, S.J., 1990. Short-term responses to selection for parameters of the allometric-autoregressive model. *South African Journal of Animal Science* 20, 57-64.
- SCHOLTZ, M.M., ROUX, C.Z., DE BRUIN, D.S. & SCHOEMAN, S.J., 1990. Medium-term responses to and changes in fitness with selection for parameters of the allometric-autoregressive model. *South African Journal of Animal Science* 20, 65-70.
- SCHOLTZ, M.M., ROUX, C.Z. & SCHOEMAN, S.J., 1990. An investigation into the consequences of selection for growth size and efficiency. *South African Journal of Animal Science* 20, 169-173.

- *Upgrading/Veredeling*

- VAN NIEKERK, F.E., VAN NIEKERK, C.H., REID, G. & COETZEE, J., 1990. The bentleg syndrome in sheep. II. Association with genetic markers. *Suid Afrikaanse Veterinêre Joernaal* 61(4), 151-154.
- SCHOLTZ, M.M., ROUX, C.Z. & LOMBARD, P.E., 1990. Breeding strategies for beef cattle in the subtropics and tropics: terminal crossbreeding. *Proceedings of the 4th World Congress on Genetics Applied to Livestock Production* 15, 361-364.

VETERINARY RESEARCH VEEARTSENYKUNDIGE NAVORSING

Pathological investigations/Patologiese ondersoeke

PATHOLOGICAL INVESTIGATIONS/PATOLOGIESE ONDERSOEKE

- *Bacteriology/Bakteriologie*

- KELLERMAN, T.S., MARASAS, W.F.O., THIEL, P.G., GELDERBLUM, W.C.A., CAWOOD, M. & COETZER, J.A.W., 1990. Leukoencephalomalacie in two horses induced by oral dosing of fumonisin B₁. *Onderstepoort Journal of Veterinary Research* 57, 269-275.

- *Pathology/Patologie*

- JAEGER, H.G., BOOKER, J.J., HÜBSCHLE, 1990. Anthrax in cheetahs (*Acinonyx jubatus*) in Namibia. *Journal of wildlife Diseases* 26(3), 423 pp.

Food hygiene/Voedselhigiëne

ANIMAL FOODS/DIERLIKE VOEDSELS

- *Microbiology/Mikrobiologie*

- APPS, P.J., 1990. High precision sampling of sub-nanogram, low parts-per-billion solutes from liquids using the dynamic solvent effect. *Journal of Chromatography* 511, 271-279.
- APPS, P.J., GORDON, D., VILJOEN, H.W. & PRETORIUS, V., 1990. Chromatographic analysis of species specific odour profiles in *Mastomys natalensis* and *M. coucha* (Rodentia: Muridae). *Journal of Chemical Ecology* 16, 2667-2676.

- APPS, P.J. & WINTERBACH, HANLIE W., 1991. A "splitless" conversion for the Hewlett Pakard HP19395A automatic headspace sampler. *Journal of High Resolution Chromatography* 14, 15-17.
- APPS, P.J., 1990. High precision sampling of trace gas-borne volatiles by the dynamic solvent effect with a comparative review of alternative techniques. *Journal of Chromatography* 504, 21-43.
- APPS, P.J., 1990. Dynamic solvent effect sampling for quantitative analysis of mammalian semiochemicals. In: Macdonald, S. Natynczuk & D. Müller-Schwarze. (Ed.). *Chemical Signals in Vertebrates*. V. Oxford University Press, Oxford, pp. 23-33.
- BURGER, CARINA, PRETORIUS, V. & APPS, P.J., 1990. High precision air sampling using the dynamic solvent effect: a possible sampling method for atmospheric carcinogens. *International Journal of Environmental Studies* 35, 209-213.

• *Pathology/Patologie*

- DU PREEZ, J.H., GIESECKE, W.H. & HATTINGH, P.J., 1990. Heat stress in dairy cattle and other livestock under southern African conditions. I. Temperature-humidity index mean values during the four main seasons. *Onderstepoort Journal of Veterinary Research* 57, 77-87.
- DU PREEZ, J.H., GIESECKE, W.H., HATTINGH, P.J. & EISENBERG, B.E., 1990. Heat stress in dairy cattle under southern African conditions. II. Observed true and predicted temperature-humidity index values to indicate areas of potential heat stress during the five hottest months of the year. *Onderstepoort Journal of Veterinary Research* 57, 183-187.
- DU PREEZ, J.H., HATTINGH, P.J. GIESECKE, W.H. & EISENBERG, B.E., 1990. Heat stress in dairy cattle and other livestock under southern African conditions. III. Monthly temperature-humidity index mean values and their significance to the performance of dairy cattle. *Onderstepoort Journal of Veterinary Research* 57, 243-248.
- DURAND, ANNETTE M., GIESECKE, W.H., BARNARD, MARIE-LUISE, VAN DER WALT, MARTHA L. & STEYN, HELENA C., 1990. *Salmonella* isolated from feeds and feed ingredients during the period 1982-1988: animal and public health implications. *Onderstepoort Journal of Veterinary Research* 57, 175-181.
- DURAND, ANNETTE M., GIESECKE, W.H., BARNARD, MARIE-LUISE, VAN DER WALT, MARTHA L. & STEYN, HELENA C., 1990. *Salmonella* isolated from feed and feed ingredients during the priod 1982-1988: animal and public health implications. *Onderstepoort Journal of Veterinary Research* 57, 175-181.

Toxicological investigations/Toksikologiese ondersoek

TOXIC SUBSTANCES/TOKSIESE STOWWE

• *Toxicology/Toksikologie*

- GRANT, RINA, BASSON, P.A., BOOKER, HELEN H., HOFHERR, J.B. & ANTHONISSEN, M., 1991. Cardiomyopathy caused by avocado (*Persea americana* Mill) leaves. *Tydskrif van die Suid-Afrikaanse Veterinêre Vereniging* 62(1), 21-22.
- GUMMOW, B., & ERASMUS, G.L., 1990. Pyridoxine (a vitamin B6) and its derivative pyridoxal as treatment for *Albizia versicolor* poisoning in guinea-pigs. *Onderstepoort Journal of Veterinary Research* 57, 109-114.
- GUMMOW, B., BOTHA, C.J., BASSON, A.T. & BASTIANELLO, STELLA S., 1991. Copper toxicity in ruminants: air pollution as a possible cause. *Onderstepoort Journal of Veterinary Research* 58, 33-40.
- VILJOEN, G.J., VAN WYNGAARDT, S., GOTHE, R., VISSER, L., BEZUIDENHOUT, J.D. & NEITZ, A.W.H., 1990. The detection and isolation of a paralysis toxin present in *Argas (persicarga) walkerae*. *Onderstepoort Journal of Veterinary Research* 57, 163-168.

Internal parasite investigations/Interne parasietondersoek

HELMINTHS/HELMINTE

• *Pests/Plae*

- VAN WYK, J.A., GROENEVELD, H.T. & CARMICHAEL, I.H., 1990. Evaluation of the efficacy of anthelmintics against parafilariosis in cattle. *Onderstepoort Journal of Veterinary Research* 57, 103-108.

• *Chemical control/Chemiese beheer*

- VAN WYK, J.A., 1990. The epidemiology and control of nematode parasites and *Oestrus ovis* in the winter rainfall area. *Journal of the South African Veterinary Medical Association* 61(4), 148-149.
- VAN WYK, J.A., 1990. Integrated worm control as a strategy in the control of gastrointestinal nematodes of sheep and cattle. *Journal of the South African Veterinary Medical Association* 61(3), 141-145.
- VAN WYK, J.A., G.F. GERBER, H.M. & ALVES, REGINA M.R., 1990. A field strain of *Trichostrongylus colubriformis* resistant to levamisole and morantel in South Africa. *Onderstepoort Journal of Veterinary Research* 57, 119-122.
- VAN WYK, J.A., VAN SCHALKWYK, L., GERBER, H.M., VAN SCHALKWYK, P.C. & ALVES, R.M.R., 1989. Die moontlikheid om 'n weerstandige rondewurmstam te beheer deur dit op die weiding deur 'n vatbare wurmstam te vervang. *Suid-Afrikaanse Tydskrif vir Wetenskap* 85, 131.
- VAN WYK, J.A., GERBER, H.M., BATH, G.F., ALVES, R.M.R. & VISSER, E.L., 1989. Weerstandbiedendheid van veldstamme van *Haemonchus contortus* en *Trichostrongylus colubriformis* van skape teen levamisool en morantel. *Suid-Afrikaanse Tydskrif vir Wetenskap* 85, 130-131.
- VAN WYK, J.A., 1990. A review of chemical methods available for the control of gastrointestinal nematodes of sheep and cattle. *Journal of the South African Veterinary Medical Association* 61(3), 136-140.

Reproduction investigations/Reproduksie-ondersoeke

INFERTILITY/ONVRUGBAARHEID

• *Pathology/Patologie*

- CHAPARRO, F., LAWRENCE, J.V., BENGIS, R. & MYBURGH, J.G., 1990. A serological survey for brucellosis in buffalo (*Syncerus caffer*) in the Kruger National Park. *Journal of the South African Veterinary Association* (61)3, 110-111.
- HERR, S., EHRET, W.J., RIBEIRO, L.M.M. & CHAPARRO, F., 1990. The persistence of serological reactions following heifer vaccination with *Brucella abortus* strain 19 on brucellosis-free farms. *Journal of the South African Veterinary Association* 61, 11-13.
- HERR, S., RIBEIRO, L.M. & CHAPARRO, F., 1990. Persistent infection with *Brucella abortus* biotype 1 in a cow. *Journal of the South African Veterinary Association* 61, 76.
- HERR, S., 1989. Causes of foetal death in cattle. *Zimbabwe Veterinary Journal* 20, 167-168.
- MYBURGH, J.G., BENGIS, R.G., BESTER, C.J.J. & CHAPARRO, F., 1990. Serological reactions to *Leptospira* species in buffalo (*Syncerus caffer*) from the Kruger National Park. *Onderstepoort Journal of Veterinary Research* 57, 281-282.
- MYBURGH, J.G. & OTTO, Q.T., 1990. Serological survey of bovine leptospirosis in the Volksrust district. *Journal of the South African Veterinary Association* 61, 172-173.
- RIBEIRO, L.M.M., 1990. An efficient medium for the isolation of *Trichomonas foetus*. *Onderstepoort Journal of Veterinary Research* 57, 209-210.
- RIBEIRO, L.M.M., HERR, S., CHAPARRO, F. & VAN DER VYVER, F.H., 1990. The isolation and serology of *Brucella melitensis* in a flock of goats in central RSA. *Onderstepoort Journal of Veterinary Research* 57, 143-144.

Entomological investigations/Entomologiese ondersoeke

EXTERNAL PARASITES/EKSTERNE PARASIEDE

• *Taxonomy/Taksonomie*

- BROTHERS, D.J. & NEWBERRY, K., 1990. Interspecific mating in bedbugs does not support the recognition concept of species: comments on Ferguson, *South African Journal of Science* 86, 176-177.
- SPICKETT, A.M. & VAN ARK, H., 1990. Fitting the Gompertz function to dose-response data of larval tick populations. *Onderstepoort Journal of Veterinary Research* 57, 115-118.
- SPICKETT, A.M., HORAK, I.G., BRAACK, L.E.O. & VAN ARK, H., 1991. Drag-sampling of free-living ixodid ticks in the Kruger National Park. *Onderstepoort Journal of Veterinary Research* 58, 27-32.

- *Entomology/Entomologie*

- NEWBERRY, K., MCHUNU, Z.M. & CEBEKHULU, S.Q., 1990. The effects of bedbug control on malaria control operations. *South African Journal of Science* 86, 211-212.
- NEWBERRY, K., 1990. The tropical bedbug *Cinex hemipterus* near the southernmost extent of its range. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 84, 745-747.

- *Pathology/Patologie*

- DU PLESSIS, J.L., VAN GAS, L., LABUSCHAGNE, F.J. WIJMA, S., 1990. The freeze-drying of *Cowdria ruminantium*. *Onderstepoort Journal of Veterinary Research* 57, 145-149.
- VENTER, G.J., HILL, ELAINE, PAJOR, I.T.P. & NEVILL, E.M., 1991. The use of a membrane feeding technique to determine the infection rate of *Culicoides imicola* (Diptera: Ceratopogonidae) for 2 bluetongue virus serotypes in South Africa. *Onderstepoort Journal of Veterinary Research* 58, 5-9.
- VENTER, G.J., HILL, ELAINE, PAJOR, I.T.P. & NEVILL, E.M., 1991. The use of a membrane feeding technique to determine the infection rate of *Culicoides imicola* (Diptera: Ceratopogonidae) for 2 bluetongue virus serotypes in South Africa. *Onderstepoort Journal of Veterinary Research* 58, 5-9.

- *Pests/Plae*

- JORDAAN, LEONORA C. & VAN ARK, H., 1991. A survey of annoyance of livestock by *Simulium chutteri* Lewis along the Orange River, South Africa (Diptera: Simuliidae). *Onderstepoort Journal of Veterinary Research* 57, 189-195.
- PETNEY, T.N., VAN ARK, H. & SPICKETT, A.M., 1990. On sampling tick populations: the problem of overdispersion. *Onderstepoort Journal of Veterinary Research* 57, 123-127.

Virus investigations/Virusondersoeke

VIRUSES/VIRUSSE

- *Virology/Virologie*

- BARNARD, B.J.H., BENGIS, R.G. & VOGES, S.F., 1990. Epidemiology of wildebeest-derived manligant catarrhal fever in South Africa; inability to transfer the disease with an African face fly *Musca xanthomelas* (Diptera: Muscidae). *Onderstepoort Journal of Veterinary Research* 57, 89-93.
- BARNARD, B.J.H., 1990. Epizootology of wildebeest-derived malignant catarrhal fever; possible transmission among cows and their calves in the north-western Transvaal. *Onderstepoort Journal of Veterinary Research* 57, 210-204.
- BARNARD, B.J.H., 1990. Wesselsbron disease virus. Virus infections of Vertebrates. Volume 3. Virus infections of ruminants. Ed. Z. Dinter & B. Morein. Amsterdam, Oxford, New York, Tokyo: Elsevier Science Publishers B. V. 1990.
- BARNARD, B.J.H., 1990. Malignant catharrhal fever: a threat to cattle farmers. In: Wildlife management in Southern Africa - A veterinary perspective. Faculty of Veterinary Science, Onderstepoort, University of Pretoria. 1990.
- DU PLESSIS, D.H., MOKHOSI, G. & HENDRY, D.A., 1991. Cell-free translation and replicative form of *Nudarelia beta* virus RNA. *Journal of General Virology* 72, 267-273.
- DU PLESSIS, H.L., FOURIE, N., NEL, P.W. & EVEZARD, D.N., 1990. Concurrent babesiosis and ehrlichiosis in the dog: Blood smear examination supplemented by the indirect fluorescent antibody test, using *Cowdria ruminantium* as antigen. *Onderstepoort Journal of Veterinary Research* 57, 151-155.
- DU PLESSIS, D.H., VAN WYNGAARDT, W. & BREMER, C.W., 1990. An indirect sandwich ELISA utilising F(ab')₂ fragments for the detection of African horsesickness virus. *Journal of Virological Methods* 29, 279-289.
- DU PLESSIS, D.H., VAN WYNGAARDT, W. & BREMER, C.W., 1990. An indirect sandwich ELISA utilising F(ab')₂ fragments for the detection of African horsesickness virus. *Journal of Virological Methods* 29, 279-289.
- DU PLESSIS, D.H., VAN WYNGAARDT, W. & BREMER, C.W., 1990. An indirect sandwich ELISA utilising F(ab')₂ fragments for the detection of African horsesickness virus. *Journal of Virological Methods* 29, 279-290.
- HUISMANS, H. & VAN DIJK, A.A., 1990. Bluetongue virus structural componenets. In: Current Tropics in Microbiology and Immunology. 162, 21-41, M. Gorman & P. Roy (Ed.). Berlin, Heidelberg: Springer-Verlag.

- HUNTER, P., VAN DER LUGT, H.H. & GOUWS, J.J., 1990. Failure of an *Actinomyces pyogenes* vaccine to protect sheep against an intravenous challenge. *Onderstepoort Journal of Veterinary Research* 57, 239-241.
- ROY, P., URAKAWA, T., VAN DIJK, A.A. & ERASMUS, B.J., 1990. Recombinant virus vaccine for bluetongue disease in sheep. *Journal of Virology* 64, 1198-2003.
- VERWOERD, D.W., 1990. Jaagsiekte (Ovine pulmonary adenomatosis). In: Virus infections of Ruminants. Ed. Dinter & Morein, Amsterdam: Elsevier, p. 453-463.

Poultry and fish diseases/Pluimvee- en vissiektes

POULTRY/PLUIMVEE

• Pathology/Patologie

- EARLÉ, R.A., HUCHZERMAYER, F.W., BENNETT, G.F. & LITTLE, R.M., 1991. Occurrence of *Plasmodium juxtanucleare* in greywing francolin. *South African Journal of Wildlife Research* 21, 30-32.
- HUCHZERMAYER, F.W. & VAN DER VYVER, F.H., 1991. Isolation of *Plasmodium circumflexum* from wild guinea fowl (*Numida meleagris*) and the experimental infection in domestic poultry. *Avian Pathology* 20, 217-227.
- HUCHZERMAYER, F.W., HORAK, I.G. & BRAACK, L.E.O., 1991. Isolation of *Aegyptianella* sp. (Rickettsiales: Anaplasmataceae) from helmeted guinea fowls in the Kruger National Park. *African Journal of Wildlife Research* 21, 15-18.

FISH/VIS

• Pathology/Patologie

- HUCHZERMAYER, F.W., HUCHZERMAYER, K.D.A. & PUTTERILL, J.F., 1991. Observations on a field outbreak of pox virus infection in young Nile crocodiles. *Journal of the South African Veterinary Association* 62(11), 27-29.

Bacterial investigations/Bakteriese ondersoeke

BACTERIA/BAKTERIEË

• Microbiology/Mikrobiologie

- AMBROSIO, R.E., HARRIS, Y. & HUCHZERMAYER, H.F.A.K., 1991. A DNA probe for the detection of *Mycobacterium paratuberculosis*. *Veterinary Microbiology* 26, 87-93.

• Pathology/Patologie

- BERRY, W.L., VAN RENSBURG, I.B.J. & HENTON, M.M., 1990. Cryptococcosis in a cat. *Journal of the South African Veterinary Association* 61, 71-76.
- DURAND, ANNETTE M., GIESECKE, W.H., BARNARD, MARIE-LUISE, VAN DER WALT, MARTHA L. & STEYN, HELENA C., 1990. *Salmonella* isolated from feed ingredients during the period 1982-1988: animal and public health implications. *Onderstepoort Journal of Veterinary Research* 57, 175-181.

Protozoal investigations/Protosoa-ondersoeke

PROTOZOA/PROTOSOA

• Pathology/Patologie

- AMBROSIO, R.E. & DE WAAL, D.T., 1990. Diagnosis of parasitic disease. *Revue Scientifique et Technique Office International des Epizooties* 9, 759-778.

- BUSH, J.B., ISAÄCSON, M., MOHAMED, A.S., MING, V.H.C., POTGIETER, F.T. & DE WAAL, D.T., 1990. Human babesiosis: a preliminary report of two cases in southern Africa. *South African Medical Journal* 78, p. 699.
- DE WAAL, D.T., POTGIETER, F.T., COMBRINK, M.P. & MASON, T.E., 1990. The isolation and transmission of an unidentified *Babesia* sp. to cattle by *Hyalomma truncatum* Kock 1844. *Onderstepoort Journal of Veterinary Research* 57, 229-232.
- DU PLESSIS, J.L., POTGIETER, F.T. & VAN GAS, L., 1990. An attempt to improve the immunization of sheep against heartwater by using different combinations of 3 stocks of *Cowdria ruminantium*. *Onderstepoort Journal of Veterinary Research* 57, 209-212.
- DU PLESSIS, J.L., 1990. Increased pathogenicity of an *Ehrlichia*-like agent after passage through *Amblyomma hebraeum*. *Onderstepoort Journal of Veterinary Research* 57, 233-237.
- DU PLESSIS, J.L., FOURIE, N., NEL, P.W. & EVEZARD, D.N., 1990. Concurrent babesiosis and ehrlichiosis in the dog: blood smear examination supplemented by the indirect fluorescent antibody test, using *Cowdria ruminantium* as antigen. *Onderstepoort Journal of Veterinary Research* 57, 151-155.
- DU PLESSIS, J.L., MEYER, E.H.H. & VAN GAS, L., 1990. An attempt to establish an inbred line of mice genetically resistant to *Cowdria ruminantium*. *Onderstepoort Journal of Veterinary Research* 57, 283-285.
- ROSSOUW, MIRINDA, NEITZ, A.W.H., DE WAAL, D.T., DU PLESSIS, J.L., VAN GAS, LETITIA & BRETT, SUSAN., 1990. Identification of the antigenic proteins of *Cowdria ruminantium*. *Onderstepoort Journal of Veterinary Research* 57, 215-221.
- ROSSOUW, MIRINDA, NEITZ, A.W.H. & DE WAAL, D.T., 1990. Identification of the antigenic proteins of *Cowdria ruminantium*. *Onderstepoort Journal of Veterinary Research* 57, 215-221.
- STOLTSZ, W.H., 1990. The role of wildlife in the epidemiology of bovine theileriosis in South Africa. *Proceedings of the International Symposium on Wildlife Management in southern Africa - A Veterinary Perspective*, Faculty of Veterinary Science, Onderstepoort, 1990, 66-73.
- STOLTSZ, W.H. & BLOUIN, E.F., 1990. Tick vectors of *Theileria parva lawrencei* in South Africa: the identity, distribution and vector efficiency of *Rhipicephalus appendiculatus* and *Rhipicephalus zambeziensis*. (Abstract). *South African Journal of Science* 86, p. 51.

Molecular biological investigations/Molekulêre biologiese ondersoeke

MACRO-MOLECULES/MAKROMOLEKULE

• Protozoology/Protosoölogie

- POSNETT, E.S., FEHRSEN, J., DE WAAL, D.T. & AMBROSIO, R.E., 1990. Application of repetitive probes to the detection of equine babesiosis. *Proceedings of the VII International Congress of Parasitology*, Paris, France, 20-40 August 1990, p. 930. (Abstract).

Biochemical investigations/Biochemiese ondersoeke

BIOCHEMICAL INVESTIGATIONS/BIOCHEMIESE ONDERSOEKE

• Virology/Virologie

- BREMER, C.W., HUISMANS, H. & VAN DIJK, A.A., 1990. Characterization and cloning of the African horsesickness virus genome. *Journal of General Virology* 71, 793-799.

Electron microscopy and photography/Elektronmikroskopie en -fotografie

- HOWGRAVE-GRAHAM A.R., PUTTERILL, J.F. & STEYN, P.L., 1989. Electron and light microscopy of extra cellular polymeres and bacteria in granular anaerobic digester sludge. *Proceedings of the Electron Microscopy Society of Southern Africa* 19, 77-78.
- PUTTERILL, J.F. & PROZESKY, L., 1990. An *in vitro* transimission and scanning electron microscopical study of *Cowdria ruminantium*. *Electron Microscopy Society of Southern Africa* 20, 109-110.

AGRICULTURAL RESOURCE UTILISATION LANDBOUHULPBRONBENUTTING

RESOURCE RESEARCH/HULPBRONNAVORSING

Primary resources/Primêre hulpbronne

SOIL/GROND

- *Taxonomy/Taksonomie*

GRONDKALSSIFIKASIEWERKGROEP, 1991. Grondklassifikasie. 'n Taksonomiese sisteem vir Suid-Afrika. *Memoirs oor die Natuurlike Landbouhulpbronne van Suid-Afrika* No. 15, Departement van Landbou-ontwikkeling, Pretoria.

- *Soil science/Grondkunde*

BOTHA, A.D.P., JOHNSON, J.C., BOTHMA, K., JOOSTE, E.M. & KIDSON, M.V., 1990. 'n Loodsprojek om die stikstoflewing van gronde te bepaal. *NIGB Inligtingsbulletin* No. B2/14.

BÜHMANN, C. & BÜMANN, D., 1990. Clay minerals as paleo-environment indicators exemplified on a karoo sequence from the Bothaville area, South Africa. *South African Journal of Geology* 93(3), 505-513.

FEY, M.V., MANSON, A.D. & SCHÜTTE, R., 1990. Acidification of the pedosphere. *South African Journal of Science* 86, 403-406.

HAARHOFF, D., 1990. Die waterhuishouding van 'n grond van die Clasthalserie onder droëland-mielieverbouing in die Wes-Transvaal. M.Sc.(Agric.)-verhandeling, Universiteit van die Oranje Vrystaat, Bloemfontein.

HATTINGH, ASTRID M., 1990. Rol van kleimineralogie in die keuse van 'n empiriese vergelyking om veldkapasiteit te voorspel. *Toegepaste Plant en Grond*, 21-24.

JOHNSON, J.C., JOOSTE, E.M. & KIDSON, M.V., 1990. A simplified method for determining the percentage of added area hydrolised by topsoils. *SIRI Information Bulletin* No. B2/13.

JOHNSON, J.C., JOOSTE, E.M. & KIDSON, M.V., 1990. The urease activity in A-horizon soils of the summer rain cropping area. *SIRI Information Bulletin* No. B2/15.

KRUGER, A.J., WASSERMANN, V.D. & VAN DER MERWE, A.H., 1990. Field response of three subtropical legumes to lime, P and K on an acid sandy soil. *South African Journal for Plant and Soil* 7, 147-154.

MATTHEE, T., 1990. Automatic background correction in atomic emission spectrometry by means of Fourier analysis. M.Sc. thesis, University of Stellenbosch, Stellenbosch.

NON-AFFILIATED SOIL ANALYSIS WORKING COMMITTEE, 1990. Handbook of standard soil testing methods for advisory purposes. Soil Science Society of South Africa, Pretoria.

SCOTNEY, D.M. & DIJKHUIS, F.J., 1990. Changes in the fertility status of South African soils. *South African Journal of Science* 86, 395-402.

WATER

- *Water requirements/Waterbehoefes*

BERLINER, P.R., NEL, A.A. & VAN DER MERWE, A.J., 1990. Investigating and modelling crop water use and productivity under conditions of water stress. *Water Research Commission Report* No. H6/1/90.

NEL, A.A. & BERLINER, P.R., 1990. Quantifying leaf water potential for scheduling irrigation of wheat under specific soil-climate conditions. *South African Journal for Plant and Soil* 7(1), 68-71.

NEL, A.A. & DIJKHUIS, F.H., 1990. The effect of seeding rate, timing of nitrogen application and frequency of irrigation on wheat growth, yield and water use. *South African Journal for Plant and Soil* 7(3), 163-166.

- *Soil science/Grondkunde*

SMITH, H.J.C., 1990. The crusting of red soils as affected by parent material, rainfall, cultivation and sodicity. M.Sc. (Agric.) thesis, University of Pretoria, Pretoria.

- SMITH, H.J.C., LEVY, G. & SHAINBERG, I., 1990. Water-droplet energy and soil amendments: effect on infiltration and erosion. *Soil Science Society of America Journal* 54, 1084-1087.
- STERN, R., 1990. Effects of soil properties and chemical ameliorants on seal formation, run-off and erosion. D.Sc. (Agric.) thesis, University of Pretoria, Pretoria.

Surveys and demarcation/Opnames en afbakening

SOIL SURVEYS/GRONDOPNAMES

- *Meteorology/Weerkunde*

- GALLOWAY, MARINA, 1990. Toets van drie koringmodelle in Suidwes-Kaapland. M.Sc.(Agric.)-tesis, Universiteit van die Oranje Vrystaat, Bloemfontein.

VELD SURVEYS/VELDOPNAMES

- *Remote sensing application/Afstandwaarnemingstoepassing*

- DREYER, LYNETTE, 1990. An investigation to determine the potential of digital LANDSAT thematic mapper data in identification of vegetation condition classes in natural systems. M.Sc. thesis, Potchefstroom University for Christian Higher Education, Potchefstroom.

LAND-USE/GRONDGEBRUIK

- *Evaluation/Evaluasie*

- JOUBERT, J. & LUDICK, B.P., 1990. Die evaluasie van die omvang en verspreiding van die bogrondse tekstuurklasse van akkerbougronde dieper as 450 mm in die landtipes van die Hoëveldstreek. *Tegniese Mededeling* No. 221, Departement Landbou-ontwikkeling, Republiek van Suid-Afrika.
- LUDICK, B.P. & WOODING, J.G., 1990. 'n Evaluasie van die aanwending en potensiaal van landbougrond en produksiestabiliteit van droëlandgewasse in die landdrosdistrikte van die Hoëveldstreek. *Tegniese Mededeling* No. 224, Departement van Landbou-ontwikkeling, Republiek van Suid-Afrika.

OTHER SURVYES/ANDER OPNAMES

- *Potential studies/Potensiaalstudies*

- SCOTNEY, D.M., VOLSCHENK, J.E. & VAN HEERDEN, P.S., 1990. The potential and utilisation of the natural resources of South Africa. Directorate of Agricultural Information, Department of Agricultural Development, Pretoria.

Irrigation and drainage research and planning/Besproeiings- en dreineringsnavorsing en -beplanning

IRRIGATION RESEARCH/BESPROEIINGSNAVORSING

- *Management/Bestuur*

- LOUW, A.A., 1990. Is die uniformiteit van besproeiing so goed as wat ons dink? *Suid-Afrikaanse Instituut vir Landbou-ingenieurs*.
- PETERS, U.W., 1990. Travelling irrigators. *Directorate Irrigation Engineering*, Pretoria.
- PETERS, U.W., 1990. Designing with travelling irrigators. *Directorate Irrigation Engineering*, Pretoria.
- PETERS, U.W., 1991. Build your own travelling irrigator. *Irrigation Symposium*, Caledon, Cape Province.
- VAN NIEKERK, A.S., 1990. Druppers vir besproeiing: hoe om te kies. *S.A. Besproeiing* 12(4), 15-20.
- VAN NIEKERK, A.S., 1991. Die effektiwiteit van verskillende filters. *Handelinge van die Besproeiingsimposium*, Caledon, 25-35.

RESOURCE UTILISATION RESEARCH (CROPS) HULPBRONBENUTTINGSNAVORSING (GEWASSE)

Field crops/Landgewasse

SMALL GRAIN/KLEINGRAAN

- *Crop science/Gewaskunde*

OOSTHUIZEN, G.G.J., 1990. Droëlandkoring: plantdightheid in die Wes-Vrystaat. *Hoëveldfokus* No. 2/90.

OIL AND PROTEIN SEEDS/OLIE- EN PROTEINSADE

- *Pests/Plae*

VAN EEDEN, C.F., 1990. Within season distribution of insect pests in groundnut fields. Entomology Symposium.

VAN EEDEN, C.F., 1990. Insekplae by grondbone in die Hoëveldstreek. *Hoëveldfokus* No. 2/90.

- *Management/Bestuur*

LAUBSCHER, P.J., 1990. Verbouingspraktyke vir sojabone (*Glycine max*) in die Hoëveldstreek. *Hoëveldfokus* No 1/90.

VAN DER MERWE, S.P., 1990. Wenke vir sonneblomverbouing in die Hoëveldstreek. *Hoëveldfokus* No. 2/90.

Garden crops/Tuingewasse

VEGETABLES/GROENTE

- *Physiology/Fisiologie*

BENNET, R.J., 1990. Volatilization of formulated ester, amine and K salt derivatives of phenoxyalkanoic herbicides: evidence to connect herbicide activity with plant nutrient status of tomato (*Lycopersicon esculentum* Mill.) plants. *South African Journal of Plant Soil* 7, 96-100.

RESOURCE UTILISATION RESEARCH (ANIMALS) HULPBRONBENUTTINGSNAVORSING (DIERE)

Ruminants/Herkouers

LARGE STOCK/GROOTVEE

- *Nutrition/Voeding*

CONRADIE, P.J.C., 1991. Invloed van heelmielies as kragvoercomponent op melkproduksie en melksamestelling. Handeling van die 30ste Jaarkongres van die Suid-Afrikaanse Vereniging vir Diereproduksie, Port Elizabeth, 26-28 Maart 1991.

CRUYWAGEN, C.W., 1990. Effect of curd forming of colostrum on absorption of immunoglobulin G in newborn calves. *Journal of Dairy Science* 73, 3287-3290.

CRUYWAGEN, C.W. & HORN-QUASS, JORETHA G., 1990. Effect of fading level and curd suppression of a calf milk replacer on nutrient digestibility and body mass gain. *South African Journal of Animal Science* (In press).

- DE BROUWER, C.H.M., VERMAAK, L.M., & SCHUTTE, A.R., 1991. Phosphorus supplementation of Simmentaler cows grazing winter veld. SASAP Congress, Port Elizabeth.
- DUGMORE, T.J. & WALSH, K.P., 1990. Milk production responses to feeding fatty acids. *South African Journal of Animal Science* 20, 35-37.
- SCHUTTE, A.R., VERMAAK, L.M., 1990. The finishing of year-old steers on Smuts finger grass (*Digitaria ensintha*) summer grazing. SASAP Congress, Stellenbosch.
- SCHUTTE, A.R., ENGELBRECHT, C., 1991. Finishing weaner beef steers on maize and sorghum silage. SASAP Congress, Port Elizabeth.
- VAN NIEKERK, A., KERNICK, R. & LISHMAN, A.W., 1990. Effect of winter nutritional levels on subsequent growth of beef heifers in the Highland sourveld of Natal. *South African Journal of Animal Science* 20, 84-89.

• *Behavioural studies/Gedragstudies*

- STEWART, IONA B., 1990. Suckling behaviour and fertility in beef cows on pasture. M.Sc.(Agric.) thesis, University of Natal, Pietermaritzburg.

• *Management/Bestuur*

- HARDY, M.B., GRAY, N.N., MATTUSHEK, D.W.A. & GRIFFITHS, J.D., 1990. The performance of beef cows on *Digitaria eriantha* silage. *Journal of the Grassland Society of Southern Africa* 7, 144-145.
- HORN-QUASS, JORETHA G & CRUYWAGEN, C.W., 1991. Increase in birth mass of dairy calves from 1987 to 1990 in a Friesian Herd. SASAP Congress, Port Elizabeth.
- VERMAAK, L.M., 1990. Bestuur en seleksie van Simmentalerkuddes in die Hoëveld. *Simmentaler Joernaal* Volume 15, No. 1, Julie 1990, 34-35.

SMALL STOCK/KLEINVEE

• *Physiology/Fisiologie*

- VAN NIEKERK, F.E., CLOETE, S.W.P., BARNARD, S.A. & HEINE, E.W.P., 1990. Plasma copper, zinc and blood selenium concentrations of sheep, goats and cattle. *South African Journal of Animal Science* 20, 144-147.
- VAN NIEKERK, F.E., CLOETE, S.W.P. & HEINE, E.W.P., 1990. Concentrations of blood minerals and metabolites, as well as production characteristics of Angora goats in the Southern Cape. *South African Journal of Animal Science* 20, 90-93.

• *Reproduction/Reproduksie*

- FOURIE, A.J. & CLOETE, S.W.P., 1990. Reproductive efficiency of breeding ewes in commercial Merino flocks in Bredasdorp district. *Proceedings of the World Merino Conference* 2-4 May 1990, Volume 2, Paper 5, 1-5.
- VENTER, J.L., 1990. Effek van prikkelvoeding op reproduksie-aspekte van lente gepaarde Merino-ooie. M.Sc. (Agric.)-tesis, Universiteit van die Oranje Vrystaat, Bloemfontein.

• *Nutrition/Voeding*

- BRAND, A.A. & CLOETE, S.W.P., 1990. Benutting van verrykte gars en 'n koring/garsmengsel as afrondingsrantsoene vir vroegspeenlamms. *Suid-Afrikaanse Tydskrif vir Veekunde* 20, 93-96.
- BRAND, A.A., CLOETE, S.W.P. & FRANCK, F., 1990. Substitution of lucerne hay by ammoniated wheat straw in growth diets for lambs. *South African Journal of Animal Science* 20, 78-83.
- BRAND, A.A. & CLOETE, S.W.P. & FRANCK, F., 1991. The effect of supplementing untreated, urea-supplemented and urea-ammoniated wheat-straw with maize-meal and/or fish-meal in sheep. *South African Journal of Animal Science* 21. (In press).
- CLOETE, S.W.P., 1990. Effect of lupin supplementation during mating on the reproductive performance of Merino ewes in the Swartland. *South African Journal of Animal Science* 20, 249-252.
- CLOETE, S.W.P. & BRAND, A.A., 1990. Response of S.A. Mutton Merino ewes and their lambs to supplementation with enriched oat, barley or triticale grain on wheat stubble grazing. *South African Journal of Animal Science* 20, 96-99.

- HERSELMAN, M.J., SMITH, W.A. & MARAIS, P.G., 1991. Die energiebehoefte van Angorabokke. SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.
- VAN NIEKERK, F.E. VAN NIEKERK, C.H., 1990. Copper and selenium supplementation of ewes grazing on pastures low in copper and selenium: effect on reproduction and concentration of plasma copper and blood selenium during pregnancy. *South African Journal of Animal Science* 20, 246-249.

- *Genetics/Genetika*

- WENTZEL, D. & HERSELMAN, M.J., 1991. Physio-endocrine responses to genetic change in the Angora goat. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.

- *Upgrading/Veredeling*

- BADENHORST, M.A., OLIVIER, J.J., CLOETE, J.A.N. & KING, B.R., 1991. Evaluasie van drie kleinveerasse in twee verskillende omgewings. SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.
- BADENHORST, M.A., 1991. Die vestiging en evaluasie van 'n genetiese fynhaar-Angorabokkudde. SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.
- ROUX, J.A., OLIVIER, J.J., PRETORIUS, A.P. & KING, B.R., 1991. The production of first generation fine x strong wool Merino sheep under veld conditions in the Karoo. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.

- *Pathology/Patologie*

- VAN NIEKERK, F.E., VAN NIEKERK, C.H., COETZEE, J. & HEINE, E.W.P., 1990. The bent-leg syndrome in sheep. I. The effect of pregnancy and age of the ewe on concentrations of plasma minerals. *Journal of the South African Veterinary Association* 61, 119-123.
- VAN NIEKERK, F.E., VAN NIEKERK, C.H., REID, G. & COETZEE, J., 1990. The bent-leg syndrome in sheep. II. Association with genetic markers. *Journal of the South African Veterinary Association* 61, 151-154.

- *Potential studies/Potensiaalstudies*

- HERSELMAN, M.J. & SUMNER, V., 1991. Produksie-eienskappe van wolskape met verskille in wolproduksiepotensiaal. SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.

- *Evaluation/Evaluasie*

- BEZUIDENHOUT, A.G., OLIVIER, J.J. & GREYLING, A.C., 1991. Evaluation of fine wool Merino sheep on cultivated pastures under irrigation. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.

- *Management/Bestuur*

- BEZUIDENHOUT, A.G., OLIVIER, J.J. & GREYLING, A.C., 1991. The effect of age on fibre diameter of genetically fine and strong wool Merino rams. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.
- BEZUIDENHOUT, A.G. & DU TOIT, J.E.J., 1991. The influence of pregnancy on intake of feedlot Merino ewes. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.
- CLOETE, S.W.P., 1990. Observations on two-tooth fleece and body traits and reproduction up to three years in Merino ewes descended from dams differing in number of lambs weaned per joining. *Proceedings of the World Merino Conference*, 2-4 May 1990, Pretoria. Volume 2, Paper 4, 1-6.
- DE LANGE, A.O. & OLIVIER, J.J., 1991. Converting a strong wool Merino flock to a fine wool flock. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.
- DIEDERICKS, J.C., 1990. Die indusering van geslagsaktiwiteit by Angorabokke deur middel van heteroseksuele kontak. M.Sc.(Agric.)-tesis, Universiteit Stellenbosch, Stellenbosch.
- DIEDERICKS, J.C., KING, P.R. & COETZER, W.A., 1991. Effect of melatonin implants on sexual activity of Angora goats in the off-season. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.
- KING, P.R., OLIVIER, J.J., SUMMER, V. & VILJOEN, K.S., 1991. Effek van speen op naspeense groei van Angorabokke. SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.

- KING, P.R., HOON, J.H. & KING, B.R., 1991. Effek van brakwater op die inname van Oumansoutbos (*Atriplex nummularia*). SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.
- KING, P.R., HERSELMAN, M.J., VILJOEN, K.S. & PIETERSE, N., 1991. Plasmakortisolvlakke by swak- en goed-groeïende Angorabokkies. SAVDP-kongres, 26-28 Maart, Port Elizabeth, RSA.
- MARAIS, P.G., 1991. The effect of feed restriction on small stock. *Proceedings of the South African Society for Animal Production*, Port Elizabeth, RSA.

• *Technology/Tegnologie*

- CLOETE, S.W.P. & HAUGHEY, K.G., 1990. Radiographic pelvimetry for the estimation of pelvic dimensions in live Merino Dormer and S.A. Mutton Merino ewes. *Journal of South African Veterinary Association* 61, 55-58.

Non-ruminants/Nie-herkouers

PIGS/VARKE

• *Nutrition/Voeding*

- BRAND, T.S., BADENHORST, H.A., SIEBRITS, F.K. & HAYES, J.P., 1990. The use of pigs both intact and with ileo-rectal anastomosis to estimate the apparent and true digestibility of amino acids in untreated, heat-treated and thermal-ammoniated grain sorghum. *South African Journal of Animal Science* 20, 223-228.
- BRAND, T.S., BADENHORST, H.A., RAS, M.N., SIEBRITS, F.K. & HAYES, J.P., 1990. Normal and heteroyellow endosperm grain sorghum as substitute for maize in pig diets. *South African Journal of Animal Science* 20, 229-233.

RESOURCE UTILISATION RESEARCH (PASTURES) HULPBRONBENUTTINGSNAVORSING (WEIDING)

Pastures/Weiding

VELD

• *Taxonomy/Taksonomie*

- JORDAAN, FRANCI P. & DE BEER, ANNELIE S., 1991. Die identifisering van meervoudige veldverwysingspersele vir die Kroonstad-Lindley-omgewing. *Tydskrif van die Weidingsvereniging van Suidelike Afrika*.

• *Physiology/Fisiologie*

- RAS, A.M., 1990. Die invloed van ontblaring en vog op die taniën- en polifenolinhoud van *Portulacaria afra*. *Tydskrif van die Weidingsvereniging van Suidelike Afrika* 7, 139-143.
- STEINKE, T.D. & NEL, L.O., 1990. A preliminary account of growth characteristics and seed germination of *Cassia mimosoides* L. in Dohne Sourveld. *Journal of the Grassland Society of Southern Africa* 7, 166-173.
- TEAGUE, W.R. & TEAGUE, ROSEMARY C., 1990. Simulating browse production and response of *Acacia karroo* to defoliation. I. Model description and sensitivity analyses. *Journal of the Grassland Society of Southern Africa* 7, 1-10.
- TEAGUE, W.R. & KILLILEA, DIANE M., 1990. The application of various chemicals to cuts made in the stem bases of *Brachystegia spiciformis* Benth., *Julbernardia globiflora* (Benth.) Troupin and *Terminalia sericea* Burch. ex DC. *Journal of the Grassland Society of Southern Africa* 7, 116-124.

• *Nutrition/Voeding*

- DE VILLIERS, J.F., 1991. The effect of nitrogen fertilization of rye grass (*Lolium multiflorum*) on the performance of sheep. M.Sc.(Agric.) thesis. University of Natal, Pietermaritzburg.

• *Ecology/Ekologie*

- JORDAAN, FRANCI P., DE BEER ANNELIE S. & JORDAAN, D.G., 1991. Habitatvoorkeure van 'n aantal grasspesies in die Kroonstad-Lindley-omgewing. *Suid-Afrikaanse Tydskrif vir Plant Grond*.
- JORDAAN, FRANCI P. & DE BEER, ANNELIE S., 1991. Habitatvoorkeure van drie-en-twintig grasspesies in die Bankenveld. *Tydskrif van die Weidingsvereniging van Suidelike Afrika*.
- LUDICK, B.P., 1990. Die invloed van geologie op die smaaklikheid van veld. *Hoëveldfokus* No. 2/90.

• *Management/Bestuur*

- DREWES, R.H., 1990. Veld: herstel deur insaai. *Hoëveldfokus* No 1/90.
- ECKARD, R.J., 1990. The relationship between the nitrogen and nitrate content and nitrate toxicity potential of *Lolium multiflorum*. *Journal of the Grassland Society of Southern Africa* 7, 174-178.
- ECKARD, R.J., 1990. The effect of the source of nitrogen on the dry matter yield, nitrogen and nitrate-N content of *Lolium multiflorum*. *Journal of the Grassland Society of Southern Africa* 7, 208-209.
- GAMMON, D.M., 1991. Patterns of defoliation under continuous and rotational grazing. *Bulletin of the Grassland Society of Southern Africa* 1, 8-19.
- GAMMON, D.M. & TWIDDY, D.R., 1990. Patterns of defoliation in four- and eight- paddock grazing systems. *Journal of the Grassland Society of Southern Africa* 7, 28-35.
- GREENFIELD, P.L. & TRIEGAARDT, G., 1991. Tolerance of *Lupinus albus* to acid soil. Congress of the South African Society of Crop Production, Stellenbosch, 29-31 January.
- HATCH, G.P., 1991. Species- and area-selection patterns in the Southern Tall Grassveld of Natal. M.Sc. thesis, University of Natal, Pietermaritzburg.
- HATCH, G.P. & TANTON, N.M., 1990. A preliminary evaluation of area-selective grazing in the southern Tall grassveld of Natal. *Journal of the Grassland Society of Southern Africa* 7, 238-242.
- O'REAGAN, P.J., 1990. The relationship between sward structure, ingestive behaviour and dietary quality in cattle grazing a *Chloris gayana* pasture. *Journal of the Grassland Society of Southern Africa* 7, 133-138.
- O'REAGAN, P.J. & MENTIS, M.T., 1990. The effect of veld condition on the quality of diet selected by cattle grazing the Natal Sour Sandveld. *Journal of the Grassland Society of Southern Africa* 7, 190-195.
- STOLTSZ, C.W. & DANCKWERTS, J.E., 1990. Grass species selection patterns on rotationally-grazed Dohne Sourveld during autumn and early winter. *Journal of the Grassland Society of Southern Africa* 7, 92-96.
- TEAGUE, W.R. & KILLILEA, DIANE M., 1990. The application of various piclorum formulations to cut stumps of *Brachystegia spiciformis* Benth., *Julbernardia globiflora* (Benth.) Troupin, *Terminalia sericea* Burch. ex DC. and *Acacia karroo* Hayne trees. *Journal of the Grassland Society of Southern Africa* 7, 125-132.
- TEAGUE, W.R. & KILLILEA, DIANE M., 1990. The effect of ringbarking *Brachystegia spiciformis* Benth., *Julbernardia globiflora* (Benth.) Troupin and *Terminalia sericea* Burch. ex DC. trees at different heights with or without the addition of a piclorum/2,4-D mixture. *Journal of the Grassland Society of Southern Africa* 7, 157-165.
- TEAGUE, W.R. & WALKER, B.H., 1990. Simulating browse production and response of *Acacia karroo* to defoliation. II. Evaluation of browse management systems and strategies. *Journal of the Grassland Society of Southern Africa* 7, 243-248.

• *Technology/Tegnologie*

- MARTENS, J.C., DANCKWERTS, J.E., STUART-HILL, G.C. & AUCAMP, A.J., 1990. Use of multivariate techniques to identify vegetation units and monitor change on a livestock production system in a semi-arid savanna of the eastern Cape. *Journal of the Grassland Society of Southern Africa* 7, 184-189.

• *Chemistry/Chemie*

- DANCKWERTS, J.E., 1990. Partitioning, storage and remobilisation of ¹⁴C assimilated by *Themeda triandra* Forssk. *Journal of the Grassland Society of Southern Africa* 7, 97-105.

CULTIVATED PASTURE/AANGEPLANTE WEIDING

• *Physiology/Fisiologie*

- BENNET, R.J. & BANDU, V.H., 1990. A role for the peripheral cap golgi apparatus in mediating root growth. *Proceedings of the Electron Microscopic Society of Southern Africa* 20, 81-85.

- BENNET, R.J., BREEN, C.M. & BANDU, V.H., 1990. A role for Ca^{2+} in the cellular differentiation of root cap cells: a re-examination of root growth control mechanisms. *Environmental and Experimental Botany* 30, 515-523.
- BENNET, R.J. & BREEN, C.M., 1991. The aluminium signal: new dimensions to mechanisms of Al tolerance. In: Wright, R.J., Baligar, V.C. & Murrman, R.P., (Ed). Utilization of acid soils for crop production. Dordrecht, Netherlands: Kluwer Academic Publishers.

• *Nutrition/Voeding*

- DE FIGUEIREDO, MARIA, MARAIS, J.P. & TANTON, N.M., 1990. The effect of nitrogen fertilization on the quality of kikuyu silage. *Journal of the Grassland Society of Southern Africa* 7, 41-45.

• *Management/Bestuur*

- COETZEE, T.G., BARNES, G.R. & TROLLOPE, W.S.W., 1990. 'n Voorlopige evaluasie van eenjarige, wintergroen weidings met speenlammers in die Oos-Kaapse Suurveld. *Tydskrif van die Weidingsvereniging van Suidelike Afrika* 7, 209-211.
- LE ROUX, C.J.G., HOWE, L.G. & DU TOIT, L.P., 1990. Die opbrengs van *Paspalum dilatatum* en *Acroceras macrum* onder besproeiing in die Dohne Suurveld. *Suid-Afrikaanse Tydskrif van Plant en Grond* 7, 240-242.
- HARRIS, DERRYN, I., 1990. The oversowing of Italian ryegrass kikuyu. M.Sc. thesis. University of Natal, Pietermaritzburg.
- MARAIS, J.P., 1990. Effect of nitrogen on the oxalate and calcium content of kikuyu grass. *Pennisetum clandestinum* Höchst. *Journal of the Grassland Society of Southern Africa* 7, 106-110.
- MARAIS, J.P., 1990. Relationship between nitrogen and other chemical compounds in kikuyu grass from long-established pastures. *South African Journal of Animal Science* 20, 147-151.
- MARAIS, J.P. & FIGENSHOU, D.L., 1990. Influence of temperature and growth stage on the diurnal fluctuation in the non-structural carbohydrate content of kikuyu (*Pennisetum clandestinum* Höchst). *Journal of the Grassland Society of Southern Africa* 7, 257-260.
- MARAIS, J.P., FIGENSHOU, D.L. & WOODLEY, G.A.J., 1990. Energy deficiency in kikuyu grass containing high levels of nitrogen. *South African Journal of Animal Science* 20, 16-20.
- MENTIS, M.T., GROSSMAN, D., HARDY, M.B., O'CONNOR, T.G. & O'REGAIN, P.J., 1990. Paradigm shifts in South African range science. *South African Journal of Science* 85, 684-686.
- VAN HEERDEN, J.M., 1990. The influence of the application of grass herbicides on the production of dryland medic and lucerne pastures in the Rûens area of the southern Cape. *Journal of the Grassland Society of Southern Africa* 7, 152-156.

Cultivated pastures/Aangeplante weiding

LEGUMES/PEULPLANTE

• *Nutrition/Voeding*

- KRUGER, A.J., WASSERMANN, V.D. & VAN DER MERWE, A.J., 1990. Field response of three subtropical pasture legumes to lime, P and K on an acid sandy soil. *South African Journal of Plant and Soil* 7, 147-154.

MIXTURES/MENGSELS

• *Nutrition/Voeding*

- VAN DEN BERG, M., KRUGER, A.J. & WASSERMANN, V.D., 1990. Die invloed van stikstof-toediening, saaidigtheid en metode van vermenging van komponente op mengsels van *Trifolium vesiculosum* en *Lolium multiflorum*. *Tydskrif van die Weidingsvereniging van Suidelike Afrika* 7, 213-216.

AGRICULTURE PRODUCTION ECONOMY RESEARCH LANDBOUPRODUKSIE-EKONOMIENAVORSING

Macro resource economy/Makrohulpbronekonomie

PRODUCTION FACTOR STUDIES/PRODUKSIEFAKTORSTUDIES

- *Production economics/Produksie-ekonomie*

STANDER, J.L., 1990. 'n Finansiële voordeel-koste-analise vir die verskaffing van besproeiingswater vanuit die Theewaterskloofdam aan die Eersteriviervallei. M.Sc.(Agric.)-tesis. Universiteit van Stellenbosch, Stellenbosch.

STRAUSS, J.S., 1991. 'n Landbou-ekonomiese evaluasie van alternatiewe besproeiingstelsels in die Vaalhartzbesproeiingsgebied, M.Sc.(Agric.)-verhandeling, Universiteit van Pretoria, Pretoria.

STRUCTURAL STUDIES/STRUKTUURSTUDIES

- *Production economics/Produksie-ekonomie*

NOWERS, R.J. & VAN ZYL, J., 1990. Die ekonomiese evaluering van herstruktueringsmoontlikhede in die Swartland. *Agrekon*.

Farm business management/Plaasbedryfsleer

BUSINESS RESULTS/BEDRYFSRESULTATE

- *Production economics/Produksie-ekonomie*

GORDIJN, R.J. & NICHOL, G.D., 1991. *Dairy business management*. Department of Agricultural Development, Natal Region, Leaflet series: Dairying in Natal.

JARVIE, E.M., 1990. *Agricultural prospects for Natal's more important enterprises excluding sugar cane*. Department of Agricultural Development, Natal Region.

NICHOL, G.D., 1991. *Sheep business management*. Department of Agricultural Development, Natal Region, Leaflet series: Sheep in Natal.

MANAGEMENT TECHNIQUES/BESTUURSTEGNIEKE

- *Production economics/Produksie-ekonomie*

WHITEHEAD, E.N.C., 1990. *Profitable crop production in the nineteen-nineties*. Directorate of Agricultural Economics, Department of Agricultural Development.

WHITEHEAD, E.N.C., 1991. *Introduction to Finrec*. Directorate of Agricultural Economics, Department of Agricultural Development.

WHITEHEAD, E.N.C., 1991. *Financial management of the beef enterprise*. Department of Agricultural Development, Natal Region, Leaflet series: Beef in Natal.

ENTERPRISE RELATIONSHIP/BEDRYFSVERHOUDINGS

- *Production economics/Produksie-ekonomie*

CURRIE, N.C., NICHOL, G.C. & HILL, M.K., 1990. *Annual ryegrass - does it pay?* Department of Agricultural Development, Directorate of Agricultural Economics, Natal Division.

MUIRHEAD, A.P., 1990. *The economic efficiency of the Cedara dairy herd*. Directorate of Agricultural Economics, Natal Division.

PAYNE, N.L., 1990. Labour related structural trends in South African commercial grain production. A comparison between the summer and winter rainfall areas, 1945-1987. *Agrecon* Vol. 29, No 4.

RESOURCE UTILISATION RESEARCH (FARMING SYSTEMS) HULPBRONBENUTTINGSNAVORSING (BOERDERYSTELSELS)

Agricultural engineering research/Landboukundige ingenieursnavorsing

AGRICULTURAL MECHANISATION/LANDBOU-MEGANISASIE

• Engineering/Ingenieurskunde

- BEUKMAN, J., 1990. Die PEPISTA Stelsel. *SAILI Simposium Joernaal* 1990, Vol. 22, 1.
- BEYERS, P.J., 1990. Ontwikkeling van 'n wringas. *SAILI Simposium Joernaal* 1990, Vol. 22, 1.
- CELLIERS, P.F., 1990. Verhittingsmeganisme (Sonpomp). *Landbou-ingenieurswese in Suid-Afrika* Vol. 22, No. 1.
- DE WET, J.A. & VISSER, R.Q., 1990. Handleiding oor vleisbeesfasiliteite. Handleiding, Direktooraat Landboumeganisasie.
- HUGO, F.J.C., 1990. Toepassing van tegnologie in moderne landbou in die R.S.A. S.A.V.G.-kongres.
- KOETSIER, J.H., 1990. ARTAWI - gerekenariseerde stel toetsapparatuur vir waaierimplemente. *SAILI Simposium Joernaal* 1990, Vol. 22, 1.
- LANDSBERG, J.P.H., 1990. Die meganiese oes van grondbone. *Oliesadenuus* April 1991.
- MATTHEE, P.v Z., 1990. Balkspuittoediening. *SAILI Simposium Joernaal* 1990, Vol. 22, 1.
- PIETERSE, H.G., 1990. Landbou-ingenieurswese en akwakultuurbedryf in S.A. *Landbou-ingenieurswese in Suid-Afrika*. Vol. 22, 1.
- PRINSLOO, M.J., 1990. Die rol van die landbou-ingenieur in die ontwikkelingsentrumkonsep. *Landbou-ingenieurswese in Suid-Afrika* Vol. 22, 1.
- RAS, M.C.D., 1990. Principles for the integration of air characteristics of mistblowers. *SAIAE Symposium Journal* 1990. Vol. 22,1.
- RAS, M.C.D., 1991. Cover/Concentrate/Control correlations. What are the implications? BCPC Symposium on Air Assisted Spraying in Crop Protection, 1991, Vol. 46.
- RAS, M.C.D., 1991. Vereiste lugsnelheidsprofile vir newelblasertoerusting in boorde. Verhandeling, Universiteit Stellenbosch, Stellenbosch.

AGRICULTURAL STRUCTURES AND FACILITIES/ LANDBOUSTUKTURE EN -FASILITEITE

• Engineering/Ingenieurskunde

- ENGELBRECHT, A.M., 1990. Ontwerpnorme vir moderne melkportale. *Landbou-ingenieurs in Suid-Afrika* Vol. 22, 1.
- PIETERSE, H.G., 1990. Die behuisingsbehoefte van Tilapia. Bladskrif, Direktooraat Landboumeganisasie.
- PIETERSE, H.G., 1990. Die behuisingsbehoefte van Forel. Bladskrif, Direktooraat Landboumeganisasie.
- PIETERSE, H.G., 1990. Faktore wat die terreinkeuse vir 'n akwakultuuronderneming beïnvloed. Bladskrif, Landboumeganisasie.
- VAN WYK, E.B., 1991. Handleiding oor skaapfasiliteite. Direktooraat Landboumeganisasie.
- VISSER, R.Q., 1990. Ventilasië van hoenderhuise. *Pluimveebulletin*.

SOIL CONSERVATION RESEARCH GRONDBEWARINGSNAVORSING

Soil conservation/Grondbewaring

EROSION/EROSIE

- *Engineering/Ingenieurskunde*

MCPHEE, P.J. & SCOTNEY, D.M., 1990. The dilemma of our soil resources. *Papers of the Veld Trust Conference on the Conservation status of Agricultural Resources in the RSA*, Pretoria, 30-31 October 1990, Session 3, 23 pp.

STRUMPFER, P.J. & JORDAN, L.C., 1990. Om te ontwikkel en te bewaar. *Handelinge van die 22 Nasionale SAILI-Symposium*, 10-14.

- *Conservation studies/Bewaringstudies*

HARTMANN, M.O., MCPHEE, P.J. & BODE, M.L., 1989. The erodibility of some soil series in the pineapple-producing coastal area of the eastern Cape. *South African Journal of Plant and Soil* 6, 271-275.

ENTREPRENEUR DEVELOPMENT ONDERNEMERSONTWIKKELING

EXTENSION SCIENCE INVESTIGATIONS VOORLIGTINGKUNDIGE ONDERSOEKE

Resources and technology/Hulpbronne en tegnologie

MAN/MENS

- *Situation analysis/Situasiebepaling*

DE WAAL, L.I. & DÜVEL, G.H., 1990. The influence of school on the academic success of first year students at a College of Agriculture. *South African Journal of Agricultural Extension* 1990, 38-44.

**REGISTERED PROJECTS
GEREGISTREERDE PROJEKTE**

CONTENTS

PLANT PRODUCTION PROMOTION	105
Agronomy research	105
<i>Summer grain</i>	105
MAIZE	105
GRAIN SORGHUM	108
BUCKWHEAT	109
<i>Small grain</i>	109
WHEAT	109
TRITICALE	113
DURUM	113
BARLEY	113
RYE	114
OATS	114
<i>Protein and oil seeds</i>	114
GROUNDNUTS	114
SUNFLOWERS	116
SOYBEANS	117
DRY BEANS	117
LUPINS	119
OTHER SEEDS	120
<i>Other agronomic crops</i>	120
COTTON	120
TOBACCO	122
SUNDRY AGRONOMIC CROPS	126
CHICORY	126
Biotechnology research	126
<i>Cell biology</i>	126
MONOCOTYLEDONS	126
DICOTYLEDONS	126
<i>Molecular biology</i>	127
MONOCOTYLEDONS	127
DICOTYLEDONS	127
Departmental gene banks	127
<i>Horticulture research</i>	127
VEGETABLES AND POTATOES	127
GRAPE VINES	127
Horticulture research	128
<i>Tuber crops</i>	128
POTATOES	128
<i>Vegetables</i>	130
TOMATOES	130
ONIONS	130
COLE CROPS	131
ROOT CROP VEGETABLES	131
LEGUME VEGETABLES	132
VINE CROPS	133

SUNDRY VEGETABLES	133
CHICORY	133
<i>Flowers and ornamental plants</i>	134
PROTEAS	134
POT PLANTS	135
CUT FLOWERS.....	136
FYNBOS	137
<i>Pome and stone fruits</i>	137
APPLES	137
PEARS	139
PEACHES	140
PLUMS.....	142
APRICOTS	143
CHERRIES	144
<i>Berry fruits</i>	144
BERRIES	144
<i>Viticulture</i>	145
TABLE GRAPES	145
WINE GRAPES	146
DRYING GRAPES	148
<i>Oenology</i>	149
WINE.....	149
BRANDY.....	150
<i>Citrus and subtropical crops</i>	150
CITRUS	150
PINEAPPLES.....	152
AVOCADO	153
BANANAS	153
DIVERSE SUBTROPICAL FRUITS	154
OTHER SUBTROPICAL CROPS	156
<i>Nut crops</i>	156
NUTS.....	156
<i>Radioisotope</i>	157
RADIOISOTOPE	157
<i>Sundry horticultural crops</i>	157
HORTICULTURAL CROPS.....	157
Plant protection research	158
<i>Entomology/Zoology</i>	158
INSECTS	158
NEMATODES	159
MITES.....	159
SPIDERS	160
HONEY-BEE	160
STORED GRAIN	160
FOREST AND TIMBER.....	160
<i>Plant pathology/Microbiology</i>	161
FUNGI	161
BACTERIA	162
VIRUSES.....	163
FOREST AND TIMBER.....	163
PASTURE CROPS.....	163

<i>Electron microscopy</i>	164
ELECTRON MICROSCOPY	164
<i>Weed research</i>	164
WEEDS.....	164
PESTICIDES	165
ANIMAL PRODUCTION PROMOTION	166
Animal production and animal products research	166
<i>Animal production</i>	166
BEEF CATTLE.....	166
DAIRY CATTLE	166
MUTTON SHEEP	167
WOOLLED SHEEP	167
PELT SHEEP.....	167
MEAT GOATS	168
PIGS.....	168
CHICKENS	168
OTHER POULTRY	169
<i>Animal products</i>	169
MEAT	169
MEAT PRODUCTS	170
MILK.....	170
DAIRY PRODUCTS.....	171
<i>Supporting animal research</i>	172
ANIMALS	172
<i>Biotechnology/Animal science</i>	174
BIOTECHNOLOGY	174
Veterinary research	174
<i>Pathological investigations</i>	174
PATHOLOGICAL INVESTIGATIONS	174
<i>Food hygiene</i>	175
ANIMAL FOODS	175
<i>Toxicological investigations</i>	175
TOXIC SUBSTANCES	175
<i>Internal parasite investigations</i>	176
HELMINTHS.....	176
<i>Reproduction investigations</i>	177
INFERTILITY	177
<i>Entomological investigations</i>	177
EXTERNAL PARASITES	177
<i>Virus investigations</i>	178
VIRUSES	178
<i>Highly contagious diseases</i>	178
HIGHLY CONTAGIOUS VIRUSES	178
<i>Poultry and fish diseases</i>	179
POULTRY.....	179
FISH.....	179
<i>Bacterial investigations</i>	179
BACTERIA	179
<i>Protozoal investigations</i>	179
PROTOZOA	179

<i>Molecular biological investigations</i>	180
MACROMOLECULES	180
<i>Biochemical investigations</i>	180
BIOCHEMICAL INVESTIGATIONS	180
<i>Chemical pathology and poison chemistry</i>	181
POISONS	181
AGRICULTURAL RESOURCE UTILISATION	182
Resource research	182
<i>Primary resources</i>	182
SOIL	182
WATER	184
CLIMATE	184
<i>Energy</i>	185
FUELS	185
<i>Surveys and demarcation</i>	185
SOIL SURVEYS	185
VELD SURVEYS	186
FAIRLY HOMOGENEOUS AGRICULTURAL AREAS	187
LAND USE	188
OTHER SURVEYS	188
<i>Irrigation development</i>	189
IRRIGATION PLANNING	189
Resource utilisation research (crops)	189
<i>Field crops</i>	189
SUMMER GRAIN	189
SMALL GRAIN	191
OIL AND PROTEIN SEEDS	193
OTHER FIELD CROPS	194
<i>Garden crops</i>	194
TUBER CROPS	194
VEGETABLES	195
OTHER GARDEN CROPS	195
<i>Fruit crops</i>	195
GRAPES	195
Resource utilisation research (animals)	195
<i>Ruminants</i>	195
LARGE STOCK	195
SMALL STOCK	200
GAME	206
<i>Non-ruminants</i>	206
OSTRICHES	206
PIGS	207
Resource utilisation research (pasture)	207
<i>Pasture</i>	207
VELD	207
RADICAL VELD IMPROVEMENT	212
CULTIVATED PASTURE	213
LUCERNE	219
ANNUAL FODDER CROPS	220
DROUGHT FODDER CROPS	221
LEGUME FODDER CROPS	221

<i>Veld</i>	222
BUSHVELD	222
<i>Cultivated pasture</i>	222
LEGUMES	222
GRASSES	222
MIXTURES	223
<i>Fodder crops</i>	223
PERENNIAL	223
Resource utilisation research (farming systems)	224
<i>Farming enterprises</i>	224
STOCK AND GAME FARMING	224
CROP FARMING	224
MIXED FARMING	225
Agricultural production economy research	225
<i>Macro resource economy</i>	225
PRODUCTION FACTOR STUDIES	225
STRUCTURAL STUDIES	225
<i>Farm business management</i>	226
BUSINESS RESULTS	226
MANAGEMENT TECHNIQUES	226
ENTERPRISE RELATIONSHIPS	228
Soil conservation research	229
<i>Soil conservation</i>	229
EROSION	229
DRAINAGE	230
Resource conservation	230
<i>Planning of areas</i>	230
FARM PLANNING	230
ENTREPRENEUR DEVELOPMENT	235
Extension science investigations	235
<i>Resources and technology</i>	235
MANAGEMENT FACTORS	235
MAN	235
RUN-OFF CONTROL	235
COMMUNICATION	236
Programmed extension	236
<i>Resource utilisation</i>	236
STOCK AND GAME FARMING	236
CROP FARMING	241
MIXED FARMING	241
FRUIT FARMING	243
VEGETABLE FARMING	244
VITICULTURE	244
IRRIGATION FARMING	245
Agricultural information services	245
<i>Information services</i>	245
Agricultural engineering services	245
<i>Mechanisation</i>	245
POWER SOURCES AND LABOUR	245
AGRICULTURAL IMPLEMENTS	245

<i>Agricultural structures and facilities</i>	246
CLIMATE-CONTROLLED STRUCTURES	246
STOCK HOUSING AND FACILITIES	246
<i>Irrigation and drainage engineering</i>	246
IRRIGATION	246
DRAINAGE	246
BOTANY	247
Botany research	247
<i>Plant taxa</i>	247
FLORA	247
ANGIOSPERMAE	247
BRYOPHYTA	249
LICHENS	249
FOSSIL PLANTS	249
<i>Vegetation</i>	249
FOREST	249
BUSHVELD	249
FYNBOS	250
GRASSLAND	250
KAROO	250
AQUATIC VEGETATION	250
NATURALISED VEGETATION	250
AFRICAN VEGETATION	251
<i>Valuable veld plants</i>	251
FOOD PLANTS	251
ORNAMENTAL PLANTS	251
COVER AND BARRIER PLANTS	252
OTHER USEFUL PLANTS	252
<i>Research collections</i>	252
NATIONAL HERBARIUM	252
SUPPORTING AND ASSOCIATED SERVICES	253
Biometric and datametric services	253
<i>Biometric services</i>	253
ANALYTIC TECHNIQUES	253

PROJECTS/PROJEKTE

PLANT PRODUCTION PROMOTION PLANTPRODUKSIEBEVORDERING

AGRONOMY RESEARCH/AKKERBOUNAVORSING

Summer grain/Somergraan

MAIZE/MIELIES

• *Physiology/Fisiologie*

- GG.2111/03/1/4: Translocation of storage carbohydrate reserves from maize stem to grain during moisture stress applied after anthesis. 1984. R. Mottram
- GG.2111/03/1/5: Micromorphological features of maize leaves that may contribute to drought tolerance or sensitivity. 1986. R. Mottram
- GG.2111/03/2/1: Identification of chemical substances and/or mechanisms in maize to be employed as reliable selection methods for resistance/tolerance against drought (heat), insect pests, microbiological pests and herbicides. 1986. C. Malan
- GG.2111/03/2/2: Development of techniques for determining chemical substances and/or mechanisms in maize to be employed as reliable selection methods for resistance/tolerance against drought (heat), insect pests, microbiological pests and herbicides. 1986. C. Malan
- GG.2111/03/2/3: Investigation of differences in metabolism, growth and production capacity of identified resistant/tolerant and sensitive maize breeding material with respect to drought (heat), insect pests, microbiological pests and herbicides. 1986. C. Malan

• *Nutrition/Voeding*

- GG.2111/05/1/3: N, P and Ca economical optima for maize on a Bergville clay loam. 1972. M.P.W. Farina
- GG.2111/05/1/8: N, P and K economical optima on a Balmoral clay loam with maize. 1975. M.P.W. Farina
- GG.2111/05/1/9: Improvement of soil acidity and determining of lime requirement indices for maize on a Balmoral clay loam in Natal. 1976. M.P.W. Farina
- GG.2111/05/1/10: pH and exchangeable Al as indices of lime requirements on acid Hutton and Avalon soil series in Natal. 1979. M.P.W. Farina
- GG.2111/05/1/13: Amelioration of subsoil acidity in maize. 1981. M.P.W. Farina
- GG.2111/05/1/16: The effect of pH and molybdenum on nitrogen requirements of maize. 1983. M.P.W. Farina
- GG.2111/05/1/18: Potassium requirements of maize on soils of the Bainsvlei form. 1981. M.P.W. Farina
- GG.2111/05/1/19: Nitrogen mineralisation in soils recommended for maize production. 1984. N.B. Greyling
- GG.2111/05/1/20: N and P fertilisation of maize in relation to long-term yield target as determined by soil and climate. 1984. O.J. van der Walt
- GG.2111/05/1/21: Nutrient placement for optimal utilisation of water and nutrition by the maize plant under mulch covering. 1985. W. du Toit
- GG.2111/05/1/23: The relative nitrogen carry-over ability of dominant maize soils. 1985. N.B. Greyling

- GG.2111/05/1/24: The relative nitrogen carry-over ability of soils recommended for maize production under controlled conditions. 1985. N.B. Greyling
- GG.2111/05/1/25: The P, Mg and S requirements of maize on dystrophic Normandien soils. 1982. M.P.W. Farina
- GG.2111/05/1/26: The effects of gypsum on mechanical profile modification on maize. 1984. M.P.W. Farina
- GG.2111/05/1/27: N-serve effects on prolific and non-prolific maize cultivars. 1985. M.P.W. Farina
- GG.2111/05/1/28: Economic optimum lime and gypsum rates on maize to combat acidity on highly weathered soils. 1985. M.P.W. Farina
- GG.2111/05/1/29: Phosphorus placement for optimal utilisation of water and nutrition by the maize plant. 1988. W. du Toit
- GG.2111/05/1/30: Gypsum as a subsoil ameliorant on acid sandy soils with maize. 1987. M.P.W. Farina
- GG.2111/05/1/31: Phosphogypsum effects on P nutrition and the effects of variable lime and P applications on gypsum movement on maize. 1987. M.P.W. Farina
- GG.2111/05/3/2: The part that nitrate: ammonium ratio plays in effective nitrogen utilisation by maize. 1983. F.G. Adriaanse
- GG.2111/05/3/3: Genotypic differences in effective nitrogen utilisation in maize. 1983. F.G. Adriaanse
- GG.2111/05/3/5: The effect of the time of nitrogen application on seed production of maize. 1985. F.G. Adriaanse
- GG.2111/05/3/6: An investigation into the efficiency of 15NO_3 uptake, assimilation and utilisation by maize roots and leaves. 1986. F.G. Adriaanse

• *Upgrading/Veredeling*

- GG.2111/07/1/1: Line development in white maize. 1948. H.O. Gevers
- GG.2111/07/1/2: The breeding of yellow maize. 1948. H.O. Gevers
- GG.2111/07/1/3: Breeding for disease resistance in maize. 1958. I.V. Whythe
- GG.2111/07/1/4: Development of populations and selection methods in maize. 1958. H.O. Gevers
- GG.2111/07/1/5: Breeding for grain quality in maize. 1965. H.O. Gevers
- GG.2111/07/1/6: Morphological variants of the maize plant. 1966. H.O. Gevers
- GG.2111/07/1/7: Photoperiodism in maize. 1970. H.O. Gevers
- GG.2111/07/1/8: Breeding for cytoplasmic and genetic male sterility in maize. 1979. J.K. Lake
- GG.2111/07/1/9: Breeding for resistance in maize to high Al levels in soil. 1975. H.O. Gevers
- GG.2111/07/1/10: Breeding for tolerance to nutritional stress in maize. 1980. H.O. Gevers
- GG.2111/07/1/11: Breeding for tolerance to climatic stress in maize. 1970. I.V. Whythe
- GG.2111/07/2/1: Development of white endosperm maize gene pools. 1971. J.G. du Plessis
- GG.2111/07/2/2: Development of yellow endosperm maize gene pools. 1971. M.I. Ansara
- GG.2111/07/2/3: Breeding for resistance against the maize streak virus. 1971. J.G. du Plessis
- GG.2111/07/2/4: Breeding for resistance against *Busseola fusca* and *Chilo partellus* in maize. 1971. J.G. du Plessis
- GG.2111/07/2/5: Evaluation for adaptation of maize. 1971. W.J.C. Badenhorst
- GG.2111/07/2/6: Development and maintenance of a germ-plasm bank for maize. 1985. J.G. du Plessis

• *Pathology/Patologie*

- GG.2111/19/1/2: A study of viruses affecting maize and relevant virus-vector studies to determine modes of transmission. 1983. S. Visser

- GG.2111/19/3/3: Development of infection techniques and rating methods for the reliable evaluation of breeding material and hybrids for smut diseases of maize. 1983. M.J. Ferreira
- GG.2111/19/3/4: Investigation of the effect of host genotype-pathogen interaction on the development of boil smut symptoms on maize. 1983. M.J. Ferreira
- GG.2111/19/3/5: Investigation of the effect of residue management on natural infection of maize by *Ustilago maydis* and resultant yield loss. 1983. M.J. Ferreira
- GG.2111/19/4/2: Identification and pathogenicity testing of organisms which are isolated from maize roots and stems. 1980. K.R. Chambers
- GG.2111/19/4/4: The epidemiology of root, stalk and cob rot of maize. 1981. K.R. Chambers
- GG.2111/19/4/6: Influence of stress factors on development of stalk rot in maize. 1980. M. Blomeyer
- GG.2111/19/4/7: Epidemiological studies of *Stenocarpella maydis* on maize. 1986. A.J. Snyman
- GG.2111/19/4/8: Survival of *Diplodia* spp. on maize. 1987. B.C. Flett

• *Pests/Plae*

- GG.2111/20/1/1: Identification of economically important soil insects in maize. 1978. T.W. Drinkwater
- GG.2111/20/4/1: The influence of winter and spring weeds in the seasonal abundance of the common autumn *Agrotis segetum* (Denis & Schiff) in maize. 1988. T.W. Drinkwater
- GG.2111/20/6/2: The ecology of the grain sorghum stalk borer, *Chilo partellus* on maize. 1984. J.M. Bate
- GG.2111/20/7/2: Ecology of the genus *Cicadulina china* on maize. 1982. G.D.J. van Rensburg
- GG.2111/20/8/2: Occurrence, distribution and ecology of ectoparasitic nematodes associated with maize in the maize producing areas. 1985. D.G.M.A. de Waele
- GG.2111/20/8/3: Taxonomical studies of Trichodoridae (Nematoda: Dorylaimida) with maize. 1985. D.G.M.A. de Waele
- GG.2111/20/8/5: The control of nematodes - resistance of maize. 1986. E.M. Jordaan
- GG.2111/20/8/6: The influence of nematodes on the yield of maize. 1984. A.H. McDonald

• *Crop science/Gewaskunde*

- GG.2111/30/1/1: Evaluation of new maize cultivars for agricultural and industrial value. 1981. W. du Toit
- GG.2111/30/1/2: Evaluation of commercial viable maize cultivars for adaptability. 1972. W. du Toit
- GG.2111/30/3/1: Tillage requirements with maize on a Hutton/Doveton soil at Cedara. 1976. J.B. Mallett
- GG.2111/30/3/2: Tillage studies with maize on a Hutton/Msinga soil at Winterton. 1977. J.B. Mallett
- GG.2111/30/3/3: Studies with maize on an Avalon sandy soil at Dundee. 1977. J.B. Mallett
- GG.2111/30/3/10: The influence of mulching, stubble mulching and ploughing on a Hutton soil type in south-eastern Transvaal with maize. 1981. J.A.G. Henning
- GG.2111/30/3/12: The effect of tillage and maize residue management on the physical properties of the soil and their influence on soil water and temperature profiles. 1983. W.A.J. Berry
- GG.2111/30/3/15: The effect upon maize yields of deep loosening and incorporation of P and K in the subsoil of a Hutton/Doveton soil with a double digger. 1982. J.B. Mallett
- GG.2111/30/3/16: Direct drilling versus conventional tillage of maize on a Hutton/Doveton soil at Cedara. 1974. J.B. Mallett
- GG.2111/30/3/17: Direct drilling of maize at Cedara. 1976. J.B. Mallett
- GG.2111/30/3/18: Large scale maize tillage machinery and land preparation and familiarisation exercise. 1982. J.B. Mallett
- GG.2111/30/3/19: Maize tillage studies on an Avalon/Normandien soil at Geluksburg. 1983. J.B. Mallett

- GG.2111/30/3/21: The influence of compaction layers in sandy soil on moisture movement and water utilisation by maize. 1985. J.A.G. Henning
- GG.2111/30/3/22: Screening of maize cultivars suited for production in stubble situations. 1984. P.M. Lang
- GG.2111/30/3/23: Basin tillage in maize production. 1984. E.B. Birch
- GG.2111/30/4/4: Weed control systems in reduced tillage maize - a comparison of different herbicide formulations on trash land. 1979. P.E.L. Thomas
- GG.2111/30/4/5: Weed control systems in no-till maize - a comparison of different herbicide systems. 1982. P.E.L. Thomas
- GG.2111/30/4/6: Weed control systems in conservation tillage maize - a comparison of different herbicide systems. 1984. P.E.L. Thomas
- GG.2111/30/4/7: The role of soil character and climatic factors with the activity of certain soil-administered grass killers - phase 1: Allachlor with maize. 1981. M.R. le Court de Billot
- GG.2111/30/4/8: The activity and residual effect of triazines on maize in South African soil - phase 1: atrazine. 1983. M.R. le Court de Billot
- GG.2111/30/4/9: Factors which influence the effectiveness of chemical weed control in stubble mulching systems with maize. 1985. T.C. van Eeden
- GG.2111/30/4/10: Evaluation of bio-assays for the prediction of atrazine activity in soils where atrazine was applied in maize during the previous season. 1988. R. Mennega
- GG.2111/30/5/1: Development of a weed reference key. 1981. J.M.J. Dumoulin
- GG.2111/30/5/2: Germination and growth of weeds in maize. 1982. M.R. le Court de Billot
- GG.2111/30/5/3: Weed competition and the effect and presence of allelopathy of weeds in maize. 1982. M.R. le Court de Billot
- GG.2111/30/6/1: Determination of maize cultivars (white). 1985. A.J. Pretorius
- GG.2111/30/6/2: Determination of colour deviations of white maize cultivars. 1986. W. du Toit
- GG.2111/30/7/1: The growth and yield of maize, grain sorghum and sunflower at given soil moisture regimes: a comparison. 1986. W.H. du Preez
- GG.2111/30/9/1: The effect of the previous crop on the performance of various crops with the emphasis on water use and other risk factors with maize as the main crop. 1989. H.L. Loubser

• *Water requirements/Waterbehoefte*

- GG.2111/31/2/2: The measurement of available soil moisture, root development, growth and production of maize on an Avalon soil in situ. 1981. R. Mottram

• *Situation analysis/Situasiebepaling*

- GG.2111/35/1/1: The monitoring of fertilisation, tillage, weed control and pest control practices in maize production. 1986. C.H. Heenop

• *Modelling/Modellering*

- GG.2111/42/1/1: The quantification of maize production risk. 1986. R. Mottram
- GG.2111/42/1/2: Evaluation of existing computer maize growth stimulation models. 1985. R.N. de Vos
- GG.2111/42/2/1: A description of the pest control situation on maize and grain sorghum and the design of a computerised pest control advice programme. 1989. J.B.J. van Rensburg

GRAIN SORGHUM/GRAANSORGHUM

• *Upgrading/Veredelings*

- GG.2112/07/1/1: Breeding for general disease resistance in grain sorghum. 1986. N.W. McClaren

GG.2112/07/2/1: Development of grain sorghum lines with improved yield and quality for human and animal use. 1983. W.G. Wenzel

GG.2112/07/2/2: Development of grain sorghum lines with resistance against sorghum aphid and stalk borer. 1985. W.G. Wenzel

GG.2112/07/2/3: Development of grain sorghum lines with improved tolerance against drought. 1985. W.G. Wenzel

• Pathology/ Patologie

GG.2112/19/1/1: The effect of climate and production practices on the occurrence and intensity of ergot (*Sphacelia sorghi*) on grain sorghum. 1981. N.W. McClaren

• Pests/ Plae

GG.2112/20/1/1: Occurrence, distribution and ecology of ectoparasitic nematodes associated with sorghum in the sorghum producing areas. 1985. D.G.M.A. de Waele

GG.2112/20/1/2: Occurrence, geographical distribution and ecology of ectoparasitic nematodes with sorghum in the sorghum producing areas. 1985. D.G.M.A. de Waele

GG.2112/20/1/3: Pathogenicity of plant-parasitic nematodes to grain sorghum. 1988. A.H. McDonald

GG.2112/20/2/1: Determination of the intra-seasonal distribution of the different developmental stages of *Busseola fusca* in grain sorghum. 1987. J.B.J. van Rensburg

GG.2112/20/2/2: Determination of economically important factors in a crop loss model for *Busseola fusca* in grain sorghum. 1987. J. van den Berg

• Crop science/ Gewaskunde

GG.2112/30/1/1: Evaluation of new and commercially viable sorghum cultivars for agricultural and industrial value and adaptability. 1958. A.J. Pretorius

GG.2112/30/2/1: Influence of row width, stand and planting dates on grain sorghum. 1987. A.J. Pretorius

GG.2112/30/2/2: The compensation ability of grain sorghum yield. 1983. A.J. Pretorius

GG.2112/30/2/3: The effect of nitrogen and time of application on the growth and grain quality of grain sorghum under minimum moisture stress. 1988. W. du Toit

• Chemistry/ Chemie

GG.2112/53/3/1: Malting quality of grain sorghum cultivars. 1985. A.J. Pretorius

BUCKWHEAT/BOKWIET

• Crop science/ Gewaskunde

GG.2113/30/1/1: Evaluation of buckwheat cultivars for agricultural industrial value and adaptability. 1974. A.J. Pretorius

Small grain/Kleingraan

WHEAT/KORING

• Physiology/ Fisiologie

GG.2121/03/1/1: Determination of the temperature requirement of wheat. 1982. G.D. Joubert

GG.2121/03/1/2: Determination of day length requirement of wheat. 1982. G.D. Joubert

- GG.2121/03/1/3: Determination of morphological/physiological characteristics of drought tolerance of wheat. 1982. J.L. Purchase
- GG.2121/03/1/5: Determination of aluminium tolerance of wheat cultivars and lines. 1983. G.D. Joubert
- GG.2121/03/1/6: Determination of coleoptile length and related aspects of wheat. 1983. G.D. Joubert

• *Nutrition/Voeding*

- GG.2121/05/1/1: Effect of nitrogen application in the winter rainfall area on protein and yield of wheat cultivars. 1983. E.G.J. Brand
- GG.2121/05/1/2: Effect of NP fertilisation on wheat under dryland conditions in the summer rainfall area at different soil and climatic situations. 1983. W.H. Killian
- GG.2121/05/1/3: Effect of NPK fertilisation on wheat under dryland conditions in the summer rainfall area at different soil levels and climatic situations. 1983. E.G.J. Brand
- GG.2121/05/1/4: Effect of NPK fertilisation on wheat under dryland conditions in the winter rainfall area at different soil and climatic situations. 1983. W.H. Killian
- GG.2121/05/1/5: Effect of different NP fertilisation on wheat under irrigation at different soil and climatic situations. 1983. W.H. Killian
- GG.2121/05/1/6: Effect of placement of fertiliser under dryland conditions on wheat in the summer rainfall area. 1983. W.H. Killian
- GG.2121/05/1/7: Effect of nitrogen application on wheat at different growth stages in the summer rainfall area. 1983. W.H. Killian
- GG.2121/05/1/8: Effect of phosphate fertilisation on wheat in the summer rainfall region. 1983. W.H. Killian

• *Upgrading/Veredelning*

- GG.2121/07/1/1: The evaluation of newly developed elite and imported winter and intermediate wheat lines. 1976. W.J.G. Kakebeeke
- GG.2121/07/1/3: The determination of the variation of the F_2 offspring between winter, intermediate and spring wheat parents. 1976. H.A. van Niekerk
- GG.2121/07/1/4: The genetic improvement of winter wheat for drought resistance. 1984. H.A. van Niekerk
- GG.2121/07/2/1: The evaluation of newly developed elite and imported dryland spring wheat lines. 1976. H.A. van Niekerk
- GG.2121/07/2/2: The evaluation of all newly developed elite and introduced spring wheat lines. 1976. H.A. van Niekerk
- GG.2121/07/3/1: Gene mapping of wheat chromosomes, using monosomic analysis. 1976. L. van Lill
- GG.2121/07/3/3: Assignment of RLFP probes to each of the 42 chromosome arms of wheat. 1990. H.A. van Niekerk
- GG.2121/07/4/1: The evaluation of wheat germ plasm. 1981. I.B.J. Smit
- GG.2121/07/4/2: The upkeep of unique wheat germ plasm. 1981. M.T. Aartsma
- GG.2121/07/5/1: The quality evaluation of all newly developed wheat lines. 1976. D. van Lill
- GG.2121/07/5/2: Evaluation of the need for and desirability of early generation selection for grain quality characteristics in wheat. 1978. H.A. van Niekerk
- GG.2121/07/5/3: Quality genotype and environmental interaction of wheat. 1976. H.A. van Niekerk
- GG.2121/07/5/4: Heritability studies concerning grain quality characteristics with wheat. 1978. H.A. van Niekerk
- GG.2121/07/5/5: Investigation of the mechanism which affect resistance to sprouting in wheat. 1970. M. Manley
- GG.2121/07/5/6: The influence of nitrogen uptake and metabolism on grain quality of wheat lines. 1979. H.A. van Niekerk

• *Pathology/ Patologie*

- GG.2121/19/1/1: Occurrence and distribution of root-and-foot-rot disease in wheat. 1978. B. de Scott
- GG.2121/19/1/5: Chemical control of root disease in wheat. 1982. E.M. Smith
- GG.2121/19/1/7: The effect of stubble management pH and nitrogen applications on grain yield of wheat in take-all infested fields. 1988. G.H.J. Kemp
- GG.2121/19/1/8: Effect of cultivation practices on crater diseases of wheat. 1988. E.M. Smith
- GG.2121/19/1/9: Evaluation of wheat cultivars for resistance against take-all (*Gaeumannomyces graminis* var. *tritici*). 1988. G.H.J. Kemp
- GG.2121/19/2/1: Observations on the occurrence of air-borne diseases of wheat in South Africa. 1980. Z.A. Pretorius
- GG.2121/19/2/2: Collection, maintenance and classification of wheat stem rust biotypes (*Puccinia graminis* f. sp. *tritici*). 1980. J. le Roux
- GG.2121/19/2/3: Collection, maintenance and classification of wheat leaf rust races (*Puccinia recondita* f. sp. *tritici*). 1980. Z.A. Pretorius
- GG.2121/19/2/4: Evaluation of wheat germ plasm for resistance to wheat stem rust biotypes (*Puccinia graminis* f. sp. *tritici*). 1983. J. le Roux
- GG.2121/19/2/5: Evaluation of wheat germ plasm for resistance to wheat leaf rust races (*Puccinia recondita* f. sp. *tritici*). 1980. Z.A. Pretorius
- GG.2121/19/2/6: Chemical control of wheat stem rust (*Puccinia recondita* f. sp. *tritici*). 1981. J. le Roux
- GG.2121/19/2/7: The expression of rust resistance in wheat. 1984. B. de Scott
- GG.2121/19/2/8: Amelioration of wheat germ plasm for the control of stem rust (*Puccinia graminis* f. sp. *tritici*) and leaf rust (*Puccinia recondita* f. sp. *tritici*). 1988. S.C. Drijepondt
- GG.2121/19/3/1: Observation on the occurrence of seed-borne diseases of wheat in South Africa. 1980. J. le Roux
- GG.2121/19/3/2: Chemical control of loose smut (*Ustilago tritici*) of wheat. 1982. J. le Roux
- GG.2121/19/3/3: Chemical control of stinking smut (*Tilletia caries* and *Tilletia foetida*) of wheat. 1981. J. le Roux
- GG.2121/19/3/4: Evaluation of wheat cultivars for resistance to stinking smut (*Tilletia caries* and *Tilletia foetida*) of wheat. 1982. J. le Roux
- GG.2121/19/4/2: Inheritance of resistance in wheat to maize streak virus. 1988. D.B. Scott
- GG.2121/19/5/1: Isolation, identification and characterisation of bacteria associated with blight of wheat and related small grains. 1988. J. Smith

• *Pests/ Plae*

- GG.2121/20/1/5: Screening of wheat breeding material for resistance to the Russian wheat aphid, *Diuraphis noxia*. 1980. F. du Toit
- GG.2121/20/1/6: The economic importance of viruses transmitted by the Russian wheat aphid *Diuraphis noxia* to wheat. 1984. F. du Toit
- GG.2121/20/1/7: The nature of the toxemia in wheat caused by the Russian wheat aphid *Diuraphis noxia*. 1982. F. du Toit
- GG.2121/20/1/8: Aspects of the biology and ecology of the wheat aphid *Diuraphis noxia* in the south-western Orange Free State including preliminary studies on the oat aphid *Rhopalosiphum padi* and the dryland aphid *Schizaphis graminum*. 1980. F. du Toit
- GG.2121/20/1/9: The evaluation of wheat breeding material for resistance to the oat aphid *Rhopalosiphum padi* and the ear aphid *Sitobion avenae*. 1985. F. du Toit
- GG.2121/20/2/1: The occurrence and distribution of injurious soil insects in wheat. 1983. F. du Toit
- GG.2121/20/2/2: Chemical control of false wire worm (Tenebrionidae) in wheat with soil and seed treatment. 1984. F. du Toit

- GG.2121/20/3/1: Survey of eelworm species in the wheat producing areas. 1983. H.A. van Niekerk
- GG.2121/20/3/2: Pathogenicity of eelworm species to wheat (glasshouse study). 1984. H.A. van Niekerk
- GG.2121/20/4/1: The occurrence and distribution of foliar pests of wheat in South Africa. 1985. F. du Toit

• *Crop science/Gewaskunde*

- GG.2121/30/1/1: Seed multiplication of wheat cultivars and lines in the winter rainfall area. 1983. E.J.G. Brand
- GG.2121/30/1/2: Seed multiplication of wheat cultivars and lines in the summer rainfall area. 1983. G.D. Joubert
- GG.2121/30/1/3: Seed multiplication of wheat cultivars and lines under irrigation. 1983. G.D. Joubert
- GG.2121/30/2/1: Wheat cultivar evaluation in the winter rainfall area. 1983. E.J.G. Brand
- GG.2121/30/2/2: Wheat cultivar evaluation in the summer rainfall area. 1983. G.D. Joubert
- GG.2121/30/2/3: Wheat cultivar evaluation under irrigation. 1983. G.D. Joubert
- GG.2121/30/3/1: Determination of the optimum planting date and sowing rate of wheat cultivars in the winter rainfall area. 1983. E.J.G. Brand
- GG.2121/30/3/2: Determination of the optimum planting date and sowing rate of wheat cultivars in the summer rainfall area. 1983. J.L. Purchase
- GG.2121/30/3/3: Determination of the optimum planting date and sowing rate of wheat cultivars under irrigation. 1983. G.J. Kotze
- GG.2121/30/4/1: The influence of soil cultivation methods on the production ability of soil with wheat in the summer rainfall region. 1982. H.A. Smit
- GG.2121/30/4/3: Wheat: the evaluation of cultivation methods to combat soil compaction and optimise the water content of sandy soils of the Winter Rainfall Region. 1986. H.A. Smit
- GG.2121/30/5/1: The control of wild oats in wheat by means of a maize/wheat production system in the summer rainfall area. 1982. H.A. Smit
- GG.2121/30/6/3: Phytotoxicity of wild oats and grass herbicides in promising wheat lines and new wheat cultivars in the Winter Rainfall Region. 1982. H.A. Smit
- GG.2121/30/6/4: Phytotoxicity of wild oats and grass herbicides on promising wheat lines and new wheat cultivars in the summer rainfall area. 1982. H.A. Smit
- GG.2121/30/6/5: Germination of requirements and herbicide resistance of wild oats. 1984. H.A. Smit
- GG.2121/30/7/1: The efficiency of broad-leaf weed control of newly registered herbicides in wheat in the winter rainfall area. 1982. H.A. Smit
- GG.2121/30/7/2: Phytotoxicity of broad-leaf herbicides on promising wheat lines and new wheat cultivars in the winter rainfall area. 1982. H.A. Smit
- GG.2121/30/7/3: Phytotoxicity of broad-leaf herbicides on promising wheat lines and new wheat cultivars in the summer rainfall region. 1982. H.A. Smit
- GG.2121/30/8/1: The effect of wild oats competition on the grain yield of wheat in the Winter Rainfall Region. 1982. H.A. Smit

• *Chemistry/Chemie*

- GG.2121/53/1/1: Evaluation and refinement of routine quality analytical procedures on wheat. 1976. H.A. van Niekerk
- GG.2121/53/1/2: Upkeep of a protein laboratory for applied quantitative protein analytical procedures of wheat. 1976. H.A. van Niekerk
- GG.2121/53/1/3: The identification of wheat cultivars by means of prolamine electrophoresis profiles. 1980. H.A. van Niekerk

TRITICALE

- *Upgrading/ Veredeling*

- GG.2122/07/1/1: The evaluation of elite newly developed and introduced cultivars. 1976. C. Bothma
- GG.2122/07/2/1: The selection of meiotic stable breeding parents from advanced triticales lines. 1976. H.A. van Niekerk
- GG.2122/07/3/1: The evaluation of triticales germ plasm. 1981. I.B.J. Smit
- GG.2122/07/3/2: The upkeep of unique triticales germ plasm. 1981. M.T. Aartsma

DURUM

- *Nutrition/ Voeding*

- GG.2123/05/1/1: Effect of nitrogen fertilisation on the production and quality of durum wheat under irrigation. 1982. W.H. Killian

- *Upgrading/ Veredeling*

- GG.2123/07/1/1: The evaluation of elite newly developed and imported durum lines. 1976. H.A. van Niekerk
- GG.2123/07/2/1: The evaluation of durum germ plasm. 1981. I.B.J. Smit
- GG.2123/07/2/2: The upkeep of unique durum germ plasm. 1981. M.T. Aartsma
- GG.2123/07/3/1: The quality evaluation of all newly developed durum lines. 1976. H.A. van Niekerk

BARLEY/GARS

- *Upgrading/ Veredeling*

- GG.2124/07/1/1: The breeding of barley and evaluation of elite newly developed and imported cultivars. 1976. P.B. le Grange
- GG.2124/07/2/1: The evaluation of barley germ plasm. 1981. I.B.J. Smit
- GG.2124/07/2/2: The upkeep of unique barley germ plasm. 1981. M.T. Aartsma
- GG.2124/07/3/1: Quality evaluation of all new barley lines for brewing characteristics. 1976. L. van Lill

- *Pathology/ Patologie*

- GG.2124/19/1/1: Observations on the occurrence of foliar diseases on barley in the Western Cape Province. 1988. D.B. Scott
- GG.2124/19/1/2: Chemical control of foliar diseases and its effect on yield and quality of barley in the Western Cape Province. 1988. D.B. Scott

- *Crop science/ Gewaskunde*

- GG.2124/30/1/1: Seed multiplication of elite barley lines and cultivars in the winter rainfall area. 1982. E.J.G. Brand
- GG.2124/30/1/2: Seed multiplication of the elite barley lines and cultivars in the summer rainfall area. 1982. G.D. Joubert
- GG.2124/30/2/1: Determination of the optimum planting date and sowing rate of barley cultivars in the winter rainfall area. 1983. E.J.G. Brand

- GG.2124 30 3 2: Phytotoxicity of wild oat herbicides on barley in the winter rainfall area. 1982. H.A. Smit
- GG.2124 30 3 3: Phytotoxicity of herbicides on promising barley lines and new barley cultivars in the summer rainfall area. 1982. H.A. Smit
- GG.2124, 30/3/4: The determination of the apex development stages of barley for the safe application of hormone type herbicides in the summer rainfall area. 1982. H.A. Smit

RYE/ROG

- *Upgrading/Veredeling*

- GG.2125/07/1/1: The evaluation of elite newly bred and imported rye lines. 1976. H.A. van Niekerk
- GG.2125/07/2/1: The evaluation of germ plasm. 1981. I.B.J. Smit
- GG.2125/07/2/2: The upkeep of unique rye germ plasm. 1981. M.T. Aartsma

OATS/HAWER

- *Upgrading/Veredeling*

- GG.2126/07/1/1: The evaluation of elite newly developed oat lines and introductions. 1976. M.T. Aartsma
- GG.2126/07/2/1: The evaluation of oat germ plasm. 1981. I.B.J. Smit
- GG.2126/07/2/2: The upkeep of unique oat germ plasm. 1981. M.T. Aartsma

- *Crop science/Gewaskunde*

- GG.2126/30/1/1: The multiplication of elite oat lines in the winter rainfall area. 1982. E.J.G. Brand
- GG.2126/30/1/2: Seed multiplication of elite oat lines in the summer rainfall area. 1982. G.D. Joubert
- GG.2126/30/2/1: Determination of the optimum planting date and sowing rate of oat cultivars in the winter rainfall area. 1982. E.J.G. Brand
- GG.2126/30/2/2: Determination of the optimum planting date and sowing rate of oat cultivars in the summer rainfall area. 1982. G.D. Joubert
- GG.2126/30/3/1: The determination of the safe apex development stages of oat for the application of hormone type herbicides in the summer rainfall area. 1982. A.J. Botes

Protein and oil seeds/Proteien- en oliesade

GROUNDNUTS/GRONDBONE

- *Physiology/Fisiologie*

- GG.2131/03/2/1: The influence of varying temperatures on the gynophore and pod set of groundnuts. 1983. J. Dreyer

- *Nutrition/Voeding*

- GG.2131/05/1/1: NPK fertiliser studies with groundnuts. 1983. H.L. Loubser
- GG.2131/05/1/2: The influence of boron and calcium fertilisation on mould contamination of groundnuts. 1984. C.J. Swanevelder
- GG.2131/05/1/3: Calcium fertilisation of groundnuts. 1985. C.J. Swanevelder
- GG.2131/05/1/5: Foliar application of seaweed extract on groundnuts. 1985. C.J. Swanevelder

• *Upgrading/Veredeling*

- GG.2131/07/1/1: Evaluation of introductions and breeding parents of groundnuts. 1974. P.J.A. van der Merwe
- GG.2131/07/1/2: The improvement of groundnuts for dryland conditions. 1974. P.J.A. van der Merwe
- GG.2131/07/1/3: The improvement of groundnuts for irrigation areas. 1974. P.J.A. van der Merwe
- GG.2131/07/1/5: Studying and development of anther culture techniques in aid of development of new groundnut cultivars. 1986. P.C.W. van der Walt
- GG.2131/07/1/6: Identification of resistance of groundnut genotypes of *Ditylenchus destructor*. 1988. E.M. Jordaan

• *Pathology/Patologie*

- GG.2131/19/1/1: Fusarium diseases of dryland cultivated groundnuts. 1985. S.H. Swart
- GG.2131/19/2/1: *Macrophomina* infections on groundnuts. 1985. E.L. Holtzhausen
- GG.2131/19/3/1: The influence of groundnut root and pod exudates on *Chalara elegans*. 1984. J.R. Anderson
- GG.2131/19/3/2: The influence of groundnut rhizosphere micro-organisms in controlling/stimulating *Chalara elegans* infestation. 1984. J.R. Anderson
- GG.2131/19/3/3: Interactions between *Chalara elegans* and saprophytic or ecto-parasitic nematodes in the dissemination of disease (black hull) on groundnuts. 1984. J.R. Anderson
- GG.2131/19/3/4: Method of entry of *Chalara elegans* into groundnut tissue. 1984. J.R. Anderson
- GG.2131/19/3/5: Development of reproducible and accurate method for enumerating spores of *Chalara elegans* in groundnuts, soils and plant debris. 1984. J.R. Anderson
- GG.2131/19/3/6: Laboratory studies on the nutritional requirements and biochemical pathways of *Chalara elegans* as found on groundnuts. 1984. J.R. Anderson
- GG.2131/19/3/7: Laboratory and greenhouse preliminary screens on groundnuts for biocides active against *Chalara elegans*. 1984. J.R. Anderson
- GG.2131/19/3/8: Developing of laboratory-greenhouse method for testing groundnut genotypes for resistance to *Chalara elegans*. 1983. B.L. Jones
- GG.2131/19/3/9: The use of crop rotations in controlling *Chalara elegans* in groundnuts. 1983. B.L. Jones
- GG.2131/19/3/10: Survey of naturally occurring *Chalara elegans* in the groundnut production areas of the RSA. 1982. B.L. Jones
- GG.2131/19/3/11: Biological control of *Chalara elegans* in groundnuts. 1982. J.R. Anderson
- GG.2131/19/3/13: To investigate the mode of *Chalara elegans* resistance in groundnuts. 1985. B.L. Jones

• *Pests/Plae*

- GG.2131/20/1/1: *Hilda patruelis* and mould on groundnuts. 1984. C.J. Swanevelder
- GG.2131/20/2/1: A survey of the incidence of plant parasitic nematodes on groundnuts in South Africa. 1987. C. Bolton
- GG.2131/20/2/2: The occurrence of *Ditylenchus destructor* on groundnuts and its effect on groundnut production. 1987. C. Bolton
- GG.2131/20/2/3: Pathogenicity of *Ditylenchus destructor* to groundnut genotypes. 1988. C. Bolton
- GG.2131/20/2/7: Survival of *Ditylenchus destructor* on groundnuts. 1987. D.G.M.A. de Waele
- GG.2131/20/2/8: Chemical control of *Ditylenchus destructor* on groundnut fields. 1987. A.H. McDonald
- GG.2131/20/2/9: The control of *Ditylenchus destructor* on groundnut seeds. 1987. A.H. McDonald

GG.2131/20/2/11: Host range studies of *Ditylenchus destructor* with groundnuts. 1987. D.G.M.A. de Waele

• *Integrated control/Geïntegreerde beheer*

GG.2131/23/1/1: Competition components of weeds in groundnuts. 1987. A.P.J. de Beer

• *Crop science/Gewaskunde*

- GG.2131/30/1/1: Groundnut cultivar evaluation in different production areas. 1977. C.J. Swanevelder
- GG.2131/30/2/3: Harvesting techniques and mould contamination of groundnuts. 1985. C.J. Swanevelder
- GG.2131/30/3/1: The influence of planting date on runner type groundnuts. 1985. C.J. Swanevelder
- GG.2131/30/4/1: Determining the effect of nut grass, *Cyperus* spp. on the yield of groundnuts. 1982. A.P.J. de Beer
- GG.2131/30/4/2: The effect of Dinitroanilien herbicide on the growth and development of the runner type groundnuts. 1983. A.P.J. de Beer
- GG.2131/30/8/1: Studies on spacing with newly released groundnut cultivars. 1985. C.J. Swanevelder

• *Water requirements/Waterbehoefte*

- GG.2131/31/1/1: Crop factor determination for groundnuts under irrigation. 1988. W. Jansen
- GG.2131/31/1/2: Irrigation scheduling for groundnuts. 1986. W. Jansen

SUNFLOWERS/SONNEBLOMME

• *Nutrition/Voeding*

- GG.2132/05/1/4: The effect of mycorrhiza on the utilisation of phosphorus by sunflowers. 1985. H.L. Loubser
- GG.2132/05/1/5: The influence of nitrogen and moisture levels on the growth and yield of sunflowers. 1985. H.L. Loubser
- GG.2132/05/1/6: The effect of nitrogen, phosphorus and moisture levels on the nitrogen and phosphorus removal by different plant components. 1984. H.L. Loubser
- GG.2132/05/1/7: The effect of nitrogen and phosphorus levels on the growth and yield of sunflowers under irrigation. 1985. H.L. Loubser

• *Upgrading/Veredeling*

- GG.2132/07/1/1: Introduction and evaluation of sunflower lines for use in a breeding programme. 1974. W.J. Vermeulen
- GG.2132/07/1/2: The breeding of sunflower restorer lines and composites for utilisation in hybrid breeding. 1974. B.C. Greyling
- GG.2132/07/1/3: The breeding of sunflower A/B lines and composites for utilisation in hybrid breeding. 1974. W.J. Vermeulen

• *Pathology/Patologie*

- GG.2132/19/1/1: *Macrophomina* infections of sunflower. 1985. E.L. Holtzhausen

• *Crop science/Gewaskunde*

- GG.2132/30/1/1: Evaluation of sunflower cultivars in different production areas. 1978. H.L. Loubser

- GG.2132/30/1/2: The ability of sunflower cultivars to compensate for low plant populations. 1983. H.L. Loubser
- GG.2132/30/1/5: Self-pollination and self-compatibility of sunflower cultivars. 1985. E.B. Birch
- GG.2132/30/1/6: Tolerance of sunflower cultivars to Al toxicity. 1983. E.B. Birch
- GG.2132/30/2/2: Row spacing on basin tillage in sunflower production. 1985. E.B. Birch
- GG.2132/30/2/3: Weed control for basin tillage in sunflower production. 1985. E.B. Birch
- GG.2132/30/2/4: Infiltration rate of sunflower soils. 1985. E.B. Birch
- GG.2132/30/2/5: Run-off on sunflower soils. 1985. E.B. Birch
- GG.2132/30/2/6: Mulch period and level on sunflower production. 1985. E.B. Birch
- GG.2132/30/2/7: Millet mulching in sunflower production. 1985. E.B. Birch
- GG.2132/30/2/8: Mulch crops in sunflower production. 1985. E.B. Birch

• *Modelling/Modellering*

- GG.2132/42/1/1: Predicting of the effect of nitrogen fertilisation and moisture supply on the yield of sunflowers. 1985. H.L. Loubser

SOYBEANS/SOJABONE

• *Physiology/Fisiologie*

- GG.2133/03/1/2: Interaction between yield components and interplant competition of soybeans. 1985. M.A. Smit
- GG.2133/03/1/3: Identification of soybeans on a biochemical level. 1987. C. Sullivan

• *Upgrading/Veredeling*

- GG.2133/07/1/1: Evaluation of soybean lines/introductions for use as commercial cultivars and/or as parents in a breeding programme. 1983. T.E.M. Odendaal
- GG.2133/07/1/2: The selection and generation of segregating material. 1984. T.E.M. Odendaal

• *Integrated control/Geïntegreerde beheer*

- GG.2133/23/1/1: The specific susceptibility of different soybean cultivars to herbicides. 1987. T.H. Bantjes

• *Crop science/Gewaskunde*

- GG.2133/30/1/1: Evaluation of soybean cultivars in different production areas. 1978. J.N.H. Lemmer
- GG.2133/30/1/2: The influence of plant population and row spacing on different soybean cultivars. 1984. J.N.H. Lemmer
- GG.2133/30/1/3: Tolerance of soybean, sunflower and dry bean cultivars to Al toxicity. 1982. M.A. Smit
- GG.2133/30/1/4: Genotype x environment interactions on yield tests and the application to a soybean breeding programme. 1984. T.E.M. Odendaal
- GG.2133/30/2/1: Basin tillage in soybean production. 1984. E.B. Birch

DRY BEANS/DROëBONE

• *Nutrition/Voeding*

- GG.2134/05/1/1: The effect of nitrogen application levels at different growth stages of dry beans. 1983. A.J. Liebenberg

GG.2134/05/2/1: The determination of critical values for soil phosphorus and nitrogen with dry beans at two levels of the lime. 1988. J. Chapman

• *Upgrading/Veredelings*

GG.2134/07/1/1: The evaluation of dry bean introductions. 1970. W.J. Vermeulen
GG.2134/07/1/2: The breeding of dry beans for canning purposes. 1970. W.J. Vermeulen
GG.2134/07/1/3: The breeding of dry beans for the packaging trade. 1983. B.R. Edington

• *Pathology/Patologie*

GG.2134/19/1/1: The production of disease-free dry bean (*Phaseolus vulgaris*) seed at Lutzville and Burgershall. 1977. A.J. Liebenberg
GG.2134/19/1/2: The production of disease-free dry bean (*Phaseolus coccineus*) seed. 1984. A.J. Liebenberg
GG.2134/19/2/1: Survey of fungal diseases on dry bean roots in the summer rainfall regions of South Africa. 1985. S.H. Swart
GG.2134/19/2/2: Survey of fungal diseases on the pods of dry beans in the summer rainfall regions of South Africa. 1985. S.H. Swart
GG.2134/19/2/3: Survey of fungal diseases on dry bean leaves in the summer rainfall regions of South Africa. 1985. S.H. Swart
GG.2134/19/2/4: The characterisation of *Rhizoctonia solani* isolates and other *Rhizoctonia*-like fungi associated with the root rot complex of dry beans. 1988. S.H. Swart
GG.2134/19/2/5: Control of root rot of dry beans. 1988. S.H. Swart
GG.2134/19/2/6: To find a repeatable and quantifiable inoculation method for examining *Rhizoctonia* root rot of dry beans in greenhouse trials. 1987. S.H. Swart
GG.2134/19/3/1: Macrophomina infections of dry beans. 1985. E.L. Holtzhausen
GG.2134/19/4/1: Halo blight of dry beans. 1985. L. van der Walt
GG.2134/19/4/2: Common blight (*Xanthomonas phaseoli*) of dry beans. 1985. L. van der Walt

• *Crop science/Gewaskunde*

GG.2134/30/1/1: The evaluation of dry bean cultivars in different production areas. 1983. A.J. Liebenberg
GG.2134/30/1/2: The determination of the compensation ability of dry bean cultivars under varying plant densities. 1983. A.J. Liebenberg
GG.2134/30/1/3: The evaluation of dry bean cultivars and breeding lines for drought resistance. 1983. A.J. Liebenberg
GG.2134/30/1/4: The evaluation of the International Bean Yield and Adaptation Nursery (IBYAN) of CIAT. 1983. A.J. Liebenberg
GG.2134/30/1/5: The evaluation of the International Bean Rust Nursery (IBRN) of CIAT. 1983. A.J. Liebenberg
GG.2134/30/1/6: Effect of temperature on the vegetative and reproductive development of some South African dry bean (*Phaseolus vulgaris*) cultivars. 1983. E.D. Lloyd
GG.2134/30/1/9: Tolerance of soybean, sunflower and dry bean cultivars to Al toxicity. 1982. A.J. Liebenberg
GG.2134/30/2/1: The influence of planting date on dry bean cultivars under different soil moisture levels. 1983. A.J. Liebenberg

LUPINS/LUPIENE

• *Physiology/Fisiologie*

- GG.2135/03/1/1: A study on the effect of daylength and temperature on the growth and development of *Lupinus albus*, *Lupinus mutabilis* and other lupin species. 1985. J.A.M. van der Mey
- GG.2135/03/2/1: A survey on the occurrence of different alkaloids in lupin species and lines for the summer rainfall areas. 1985. J.A.M. van der Mey
- GG.2135/03/2/2: Testing for seed coat hardness in lupin species and lines for the summer rainfall areas. 1985. J.A.M. van der Mey

• *Nutrition/Voeding*

- GG.2135/05/1/1: The influence of fertiliser placement on germination, growth, development and seed yield of lupins. 1985. H.L. Loubser
- GG.2135/05/1/2: The influence of soil and pH on the growth, development and yielding of lupins in the summer rainfall area. 1985. H.L. Loubser
- GG.2135/05/1/3: Plant nutritional studies on lupins with macro-elements in the summer rainfall areas. 1985. H.L. Loubser
- GG.2135/05/1/4: Plant nutritional studies with micro-elements on lupins in the summer rainfall areas. 1985. H.L. Loubser

• *Upgrading/Veredeling*

- GG.2135/07/1/1: The development of high yielding, adapted, alkaloid-free lupin cultivars of *Lupinus albus*, *Lupinus mutabilis* and other lupin species. 1985. J.A.M. van der Mey
- GG.2135/07/1/2: The development of high yielding alkaloid-free lupin cultivars by ionic radiation and chemical mutagens. 1985. J.A.M. van der Mey
- GG.2135/07/1/3: Genetics and breeding of lupins. 1981. J.A.M. van der Mey

• *Pathology/Patologie*

- GG.2135/19/1/1: Survey of root diseases on lupins in the summer rainfall region of South Africa. 1985. D.E. Malan
- GG.2135/19/1/2: Survey of leaf and pod diseases on lupins in the summer rainfall area. 1985. D.E. Malan
- GG.2135/19/1/3: Survey of stem diseases of lupins in the summer rainfall area of South Africa. 1985. D.E. Malan
- GG.2135/19/2/1: Macrophomina infection of lupins. 1985. E.L. Holtzhausen

• *Crop science/Gewaskunde*

- GG.2135/30/1/1: Lupin cultivar evaluation in different production areas of the summer rainfall area. 1985. J.A.M. van der Mey
- GG.2135/30/2/1: Determination of optimal planting times for different lupin production areas in the summer rainfall areas. 1985. J.A.M. van der Mey
- GG.2135/30/2/2: Determination of optimal population density of lupins for the different production areas in the summer rainfall regions. 1985. J.A.M. van der Mey
- GG.2135/30/3/1: Determination of sensitivity of lupin cultivars and breeding lines to chemical weedkillers in the summer rainfall areas. 1985. A.P.J. de Beer
- GG.2135/30/3/2: Control of broad-leaf weeds in lupin plantings in the summer rainfall areas. 1985. A.P.J. de Beer

- GG.2135/30/3/3: Control of grasses and grass-like weeds in lupin plantings in the summer rainfall areas. 1985. A.P.J. de Beer

OTHER SEEDS/ANDER SADE

• Virology/Virologie

- GG.2136/12/1/1: Development of techniques for rapid and sensitive screening of *Vigna* germ plasm for virus infections and identification of virus types on *Vigna* in South Africa. 1986. J.J. Coetzee

• Crop science/Gewaskunde

- GG.2136/30/1/1: Other seeds: introduction of cowpea breeding material. 1985. J.J. Coetzee
GG.2136/30/2/1: Other seeds: evaluation of bambara in different production areas. 1984. C.J. Swanevelder

Other agronomic crops/Ander akkerbougewasse

COTTON/KATOEN

• Physiology/Fisiologie

- TK.2141/03/1/3: The effect of moisture stresses and lower night temperatures on CO₂ absorption of short-season cotton cultivars. 1988. D. Meyer
TK.2141/03/1/4: The effect of moisture stresses at different growth stages on CO₂ assimilation, growth and yield of different cotton cultivars. 1988. D. Meyer

• Nutrition/Voeding

- TK.2141/05/1/1: Response of cotton to nitrogen application with petiole analyses as diagnostic aid. 1980. M.C. Dippenaar
TK.2141/05/1/2: Long-term NPK fertiliser study with cotton. 1972. M.C. Dippenaar
TK.2141/05/1/3: Influence of mutual relation among nutrient elements in the soil and in cotton plants on the yield potential. 1983. N.J.J. Combrink
TK.2141/05/1/6: Determination of the chemical composition of plant components of cotton cultivars during the growing season. 1988. F.J. Shawe
TK.2141/05/1/7: Phosphate nutrition of cotton. 1988. C.J. Steenkamp
TK.2141/05/1/10: The influence of the previous crops on the nitrogen needs of cotton. 1988. E.J. Haumann
TK.2141/05/1/15: Nitrogen nutrition of cotton under irrigation. 1988. E.J. Haumann

• Upgrading/Veredeling

- TK.2141/07/1/1: Cotton breeding and selection. 1974. A.I. Greeff
TK.2141/07/1/2: Introduction of cotton breeding lines and cultivars from abroad. 1974. A.P.F. Cornelissen
TK.2141/07/1/4: Evaluation of the earliness of cotton (*Gossypium hirsutum*) as a factor in better insect pest and agronomic management. 1985. H.G. van Heerden
TK.2141/07/2/1: Evaluation of cotton breeding lines. 1960. A.I. Greeff
TK.2141/07/2/2: National cotton cultivar trials. 1975. G.S.P. Vink

TK.2141/07/2/3: Recovery of cotton breeding lines after a period of moisture or temperature stress. 1983. H.G. van Heerden

TK.2141/07/3/1: The investigation of fibre development of cotton by means of biotechnological methods. 1989. M.S. Hill

• *Pathology/Patologie*

TK.2141/19/1/3: A survey on the occurrence and intensity of *Verticillium* wilt in cotton in the RSA. 1983. R.J. van Wyk

TK.2141/19/1/4: Seed dressing fungicides for the control of seedling disease of cotton. 1988. A. le Roux

TK.2141/19/1/5: The interaction between *Meloidogyne incognita* race 4 and *Verticillium* wilt of cotton. 1988. R.J. van Wyk

TK.2141/19/1/6: Resistance against *Rhizoctonia* in cotton germ plasm. 1988. A. le Roux

TK.2141/19/1/7: To investigate the *Xanthomonas campestris* pv. *Malvacearum* races in South Africa for potentially new and unidentified races and the typing of these races. 1989. M.A. Mulder

• *Pests/Plae*

TK.2141/20/1/2: Survey and identification of parasitic nematodes in different cotton producing areas. 1982. R.J. van Wyk

TK.2141/20/1/3: The effect of nematocides on different nematode species and populations on cotton. 1985. E.R. van Biljon

TK.2141/20/1/4: The refinement of infra-red detection techniques (for remote sensing) to determine nematode infestation in cotton for improved management. 1985. M.S. Greeff

TK.2141/20/1/5: Survey of parasitic nematodes which occur in association with cotton including rotation crops and weeds. 1986. M.S. Greeff

TK.2141/20/1/6: Development of mass rearing techniques of *Paratrichodorus* spp. (stubby root nematode), including in vitro mass rearing in cotton. 1988. E.R. van Biljon

TK.2141/20/1/7: Evaluating cotton breeding lines and cultivars for resistance against *Meloidogyne* and *Pratylenchus* species. 1988. M.S. Greeff

TK.2141/20/1/8: Control of nematodes under dryland conditions. 1988. E.R. van Biljon

TK.2141/20/2/1: Evaluation of boll worm and flea beetle damage as influenced by different morphological/physiological attributes of cotton. 1987. E.G. Eulitz

TK.2141/20/2/2: Determination of damage by flea beetle *Nisotra weisei* (Jacoby) on cotton. 1987. E.G. Eulitz

TK.2141/20/2/3: Pest status of boll worm and flea beetle on ratoon cotton. 1987. E.G. Eulitz

TK.2141/20/2/5: Evaluation of chemical products for the control of the boll worm complex in cotton. 1988. R. van der Westhuizen

TK.2141/20/2/6: The relationship between pheromone trap catches and *Heliothis armigera* densities on cotton. 1988. A.L. Bennett

TK.2141/20/2/7: Survey and distribution of *Apion soleatum* cotton stem weevil in the RSA. 1988. A.L. Bennett

TK.2141/20/2/8: Occurrence of pests and predators in dryland and irrigated cotton. 1988. A. Nel

TK.2141/20/2/9: Threshold values for chemical control of bollworms. 1988. R. van der Westhuizen

TK.2141/20/3/1: The evaluation of cotton cultivars resistance to red spider mite. 1988. A. Nel

• *Chemical control/Chemiese beheer*

TK.2141/21/1/1: Determination of the fitotoxic effect of chemical herbicides on cotton. 1988. C.R. Nolte

• *Crop science/Gewaskunde*

- TK.2141/30/1/2: Mulching and cultivation practices for cotton. 1983. G.S.P. Vink
- TK.2141/30/1/4: Determination of the adaptability of short-season cotton cultivars with reference to plant density and row spacing. 1988. T.J. Meyer
- TK.2141/30/1/5: Determination of drought resistance and the mechanisms involved between cultivars with production practices on cotton. 1988. D. Meyer
- TK.2141/30/2/1: Chemical defoliation of cotton. 1982. J.N. de Kock

• *Water requirements/Waterbehoefies*

- TK.2141/31/1/4: The effect of irrigation and dripper spacing on the growth and yield of cotton. 1988. C. Barnard
- TK.2141/31/1/5: The effect of lateral irrigation and mepikwat treatments on growth and yield of cotton. 1988. C. Barnard
- TK.2141/31/1/6: The effect of irrigation systems, irrigation management and plant population on growth and yield of cotton. 1988. C. Barnard
- TK.2141/31/1/7: Improved non-stress baseline based on the plant water status for use in cotton irrigation scheduling. 1989. V.P. Moore
- TK.2141/31/1/8: Determining the critical plant water stress index at which irrigation has to commence for cotton. 1989. V.P. Moore
- TK.2141/31/1/9: Evaluation of the growth of cotton to the optimum application of water and soluble fertiliser by drip irrigation. 1989. V.P. Moore

TOBACCO/TABAK

• *Physiology/Fisiologie*

- TK.2142/03/1/1: Measuring of physical characteristics of flue-cured tobacco leaf. 1987. N.J.J. Combrink
- TK.2142/03/1/2: Measurement of leaf ripeness before harvest. 1987. N.J.J. Combrink
- TK.2142/03/1/4: The effect of moisture stress on CO₂ assimilation, plant development and leaf quality of flue-cured tobacco. 1988. D. Meyer
- TK.2142/03/1/5: The critical level of the plant water stress index for photosynthesis in tobacco. 1989. R.M. Zipp
- TK.2142/03/1/5: The critical level of the plant water stress index for photosynthesis in tobacco. 1989. R.M. Zipp
- TK.2142/03/2/1: An investigation of the structure of the leaf trichomes of tobacco. 1988. M.J. van der Merwe

• *Nutrition/Voeding*

- TK.2142/05/1/6: Potassium nutrition of tobacco. 1980. H.J. Boshoff
- TK.2142/05/1/9: Micro-nutrients of tobacco. A survey of the present situation in the tobacco producing areas to obtain analytical norms. 1987. C.J. Steenkamp
- TK.2142/05/1/10: Cation nutrition of tobacco. 1987. C.J. Steenkamp
- TK.2142/05/1/11: Nitrogen nutrition of tobacco. 1987. C.J. Steenkamp
- TK.2142/05/1/12: Phosphate nutrition of tobacco. 1988. C.J. Steenkamp
- TK.2142/05/1/14: An investigation of the root development of tobacco during the growing season. 1988. R. van Antwerpen
- TK.2142/05/1/16: The influence of previous crops on the nitrogen need of tobacco. 1988. E.J. Haumann
- TK.2142/05/1/19: Nitrogen and phosphate nutrition of Oriental tobacco. 1989. C.J. Steenkamp.

- TK.2142/05/1/20: Influence of nitrogen levels upon the yield and quality of Oriental tobacco. 1988. C.J. Steenkamp
- T.2142/05/1/22: Influence of nitrogen nutrition upon chemical composition and physical leaf properties. 1989. C.J. Steenkamp
- *Upgrading/Veredeling*
- TK.2142/07/1/1: Determination of breeding value of flue-cured tobacco. 1964. H.G. van Heerden
- TK.2142/07/1/2: Determination of breeding value of dark air-cured tobacco. 1964. V. le Grange
- TK.2142/07/1/3: Determination of breeding value of light air-cured tobacco. 1967. V. le Grange
- TK.2142/07/1/4: Determination of breeding value of burley tobacco. 1969. H.G. van Heerden
- TK.2142/07/1/5: Determination of breeding value of Oriental tobacco. 1969. H.G. van Heerden
- TK.2142/07/1/7: Inbreeding of the male sterility factor in some *Nicotiana tabacum* cultivars. 1956. A.P.F. Cornelissen
- TK.2142/07/1/8: Breeding of *Nicotiana tabacum* cultivars resistant to diseases. 1952. H.G. van Heerden
- TK.2142/07/1/12: A germ plasm collection of tobacco (*Nicotiana*). 1985. A.P.F. Cornelissen
- TK.2142/07/1/13: The role played by in vivo and in vitro translation systems for the characterisation and screening of potato virus Y strains in different tobacco cultivars. 1986. M.J. Bosch
- TK.2142/07/1/14: The transfer of disease resistance from *Nicotiana repanda* to *Nicotiana tabacum* cultivars. 1986. M.J. Bosch
- TK.2142/07/1/15: Improvement of air-cured tobacco varieties via the anther culture technique. 1986. M.J. Bosch
- TK.2142/07/1/16: Production and evaluation of F₁-hybrids and male sterility types of potential tobacco breeding materials. 1987. A.P.F. Cornelissen
- TK.2142/07/1/17: The inheritance-pattern of the resistance to root-knot nematodes in certain (KNST) tobacco breeding lines. 1985. A.P.F. Cornelissen
- TK.2142/07/1/18: Breeding of commercial flue-cured tobacco varieties with resistance to root-knot nematode. 1985. A.P.F. Cornelissen
- TK.2142/07/1/19: Production of air-cured tobacco varieties with root-knot nematode resistance. 1986. A.P.F. Cornelissen
- TK.2142/07/1/20: Production of burley tobacco varieties with root-knot nematode resistance. 1986. A.P.F. Cornelissen
- TK.2142/07/1/21: Production of Oriental tobacco varieties with root-knot nematode resistance. 1986. A.P.F. Cornelissen
- TK.2142/07/2/1: Evaluation of flue-cured tobacco breeding lines. 1966. H.G. van Heerden
- TK.2142/07/2/2: Evaluation of dark air-cured tobacco breeding lines. 1966. H.G. van Heerden
- TK.2142/07/2/3: Evaluation of light air-cured tobacco breeding lines. 1966. H.G. van Heerden
- TK.2142/07/2/4: Evaluation of burley tobacco breeding lines. 1966. H.G. van Heerden
- TK.2142/07/2/5: Evaluation of Oriental tobacco breeding lines. 1958. H.G. van Heerden
- TK.2142/07/2/6: The influence of topping stages on yield and quality of newly developed burley breeding lines. 1989. H.G. van Heerden
- TK.2142/07/2/7: The potential of tobacco genotypes in producing nicotine and nor-nicotine. 1989 M.S. Hill
- TK.2142/07/3/1: Evaluation of advanced breeding lines of flue-cured tobacco for the release of cultivars. 1986. H.G. van Heerden
- TK.2142/07/3/2: Evaluation of advanced breeding lines of air-cured tobacco for the release of cultivars. 1986. H.G. van Heerden
- TK.2142/07/3/3: Evaluation of advanced breeding lines of burley tobacco for the release of cultivars. 1986. H.G. van Heerden

TK.2142/07/3/4: Evaluation of advanced breeding lines of Oriental tobacco for the release of cultivars. 1986. H.G. van Heerden

• *Pathology/ Patologie*

- TK.2142/19/1/3: Chemical control of black shank in tobacco. 1980. G.C. Prinsloo
- TK.2142/19/1/7: An investigation to find an effective dosage of a chlorpicrin mixture for the control of *Phytophthora nicotianae* var. *nicotianae* in tobacco soils. 1988. D.A. de Villiers
- TK.2142/19/1/8: Isolation of *Rhizoctonia* from plant tissue as well as naturally infested soil in tobacco. 1988. J.C. Meyer
- TK.2142/19/1/9: Techniques of infesting soil as well as tobacco plants artificially with *R. solani*. 1988. J.C. Meyer
- TK.2142/19/1/10: Chemical control of *Rhizoctonia* in tobacco. 1988. J.C. Meyer
- TK.2142/19/1/11: Evaluating tobacco cultivars for resistance against *Rhizoctonia solani*. 1988. J.C. Meyer
- TK.2142/19/2/4: Investigation of vectors and vection of Potato-Y virus of tobacco in the Lowveld: survey and identification of aphids and other insects. 1985. N.C.L. du Toit
- TK.2142/19/2/6: Evaluation of *Nicotiana* species and *N. tabacum* cultivars for resistance against tomato spotted wilt virus. 1987. D.J. de Bruin
- TK.2142/19/2/7: A survey of the occurrence and distribution of economic important tobacco viruses in the tobacco production areas of the RSA. 1987. A. Swanepoel
- TK.2142/19/2/8: Evaluation of *Nicotiana* species, *N. tabacum* cultivars for resistance against the four races PVY. 1987. R.J. van Wyk
- TK.2142/19/2/9: The stability of the "bushy top" virus complex in tobacco. 1988. D.J. de Bruin
- TK.2142/19/2/10: The influence of alternative host plants on the occurrence and distribution of TMV, CMV, PVY and TEV. 1987. A. Swanepoel
- TK.2142/19/2/11: Identification of tobacco mosaic virus, cucumber mosaic virus, potato virus Y and tobacco etch virus. 1987. A. Swanepoel
- TK.2142/19/3/2: Screening for resistance among *Nicotiana* spp. cultivars and breeding lines against *Pseudomonas solanacearum*. 1985. M.C. Engelbrecht
- TK.2142/19/3/3: Chemical control of bacterial wilt in tobacco. 1986. M.C. Engelbrecht
- TK.2142/19/3/4: The influence of different crops on *Pseudomonas solanacearum* populations in tobacco soils. 1988. M.C. Engelbrecht
- TK.2142/19/3/5: An investigation to find an effective dosage of chlorpicrin mixture for the control of the bacterial wilt organisms in tobacco soils. 1988. D.A. de Villiers
- TK.2142/19/3/6: Cultivar reaction of local tobacco cultivars to chlorpicrin concentrations in tobacco soils will be determined. 1988. D.A. de Villiers
- TK.2142/19/3/7: An investigation of methods for determining *Pseudomonas solanacearum* populations in tobacco soils. 1988. M.C. Engelbrecht

• *Pests/ Plae*

- TK.2142/20/1/6: The time, leaf position and impact of boll worm attacks on tobacco. 1987. E.G. Eulitz
- TK.2142/20/2/5: The effect of nematocides on different nematode species and populations on tobacco. 1985. E.R. van Biljon
- TK.2142/20/2/7: The refinement of infra-red detection techniques (for remote sensing) to determine nematode infestation in tobacco for improved farm management. 1985. M.S. Greeff
- TK.2142/20/2/8: Survey of parasitic nematodes which occur in association with tobacco. 1986. M.S. Greeff
- TK.2142/20/3/1: Chemical control of the tobacco mite. 1987. C.L.N. du Toit
- TK.2142/20/3/2: Investigation to alternative host plants for the tobacco spidermite. 1987. C.L.N. du Toit

- *Chemical control/Chemiese beheer*

- TK.2142/21/1/1: Chemical weed control in flue-cured tobacco plantings. 1968. C.R. Nolte
- TK.2142/21/1/2: Chemical weed control in Oriental tobacco plantings. 1980. C.R. Nolte

- *Crop science/Gewaskunde*

- TK.2142/30/1/6: Chemical control of suckers on tobacco. 1968. C.R. Nolte
- TK.2142/30/3/1: The effect of harvesting practices, handling of picked leaves and colouring schedule on quality and chemical composition of Oriental tobacco. 1989. M.C. Dippenaar
- TK.2142/30/3/2: Evaluation of plant population and nitrogen fertilisation for Oriental tobacco cultivars and breeding lines. 1989. R.M. Zipp
- TK.2142/30/4/1: The effect of seedbed covers on germination of Oriental tobacco seed. 1989. D. Meyer
- TK.2142/30/4/2: The effect of the hardening process of tobacco seedlings on the growth and development of Oriental tobacco. 1989. D. Meyer
- TK.2142/30/4/3: The effect of leaf and root clipping on the growth and development of Oriental tobacco. 1989. D. Meyer
- TK.2142/30/5/1: The influence of N fertilisation, topping and spacing on the production of orange tobacco with different cultivars and breeding lines. 1989. G.J. Malan

- *Water requirements/Waterbehoefte*

- TK.2142/31/1/3: The effect of irrigation and dripper spacing on growth and yield on flue-cured tobacco. 1988. C. Barnard
- TK.2142/31/1/4: The effect of irrigation on growth and development of flue-cured tobacco. 1988. C. Barnard
- TK.2142/31/1/5: The effect of irrigation systems, irrigation management and plant population on growth yield, yield and leaf quality of tobacco. 1988. C. Barnard
- TK.2142/31/1/6: A critical plant water stress index when irrigation is to commence in tobacco types. 1989. R.M. Zipp
- TK.2142/31/3/1: Rate of change of plant water status in the tobacco plant with respect to evaporative demand. 1989. G.J. Malan
- TK.2142/31/3/2: The role of plant water status on leaf quality in tobacco under different environmental conditions. 1989. G.J. Malan

- *Technology/Tegnologie*

- TK.2142/52/1/1: Influence of drying schedules upon chemical and physical properties of burley tobacco. 1989. C.J. Steenkamp

- *Chemistry/Chemie*

- TK.2142/53/1/4: Determination of the sugar and starch contents of tobacco during the growing season. 1988. M.C. Minnaar

SUNDRY AGRONOMIC CROPS/DIVERSE AKKERBOU GEWASSE

- *Crop science/Gewaskunde*

- GG.2143/30/1/1: Introduction of rice breeding material. 1980. J.J. Coetzee
- GG.2143/30/1/2: Evaluation of cultivars for agricultural value and adaptability. 1980. J.J. Coetzee

CHICORY/SIGOREI

- *Nutrition/Voeding*

D.2144/05/1/1: The fertilisation of chicory on an Oakleaf-Limpopo. 1981. R.S. Marr

- *Upgrading/Veredeling*

D.2144/07/1/1: The selection of chicory. 1975. R.S. Marr

- *Pathology/Patologie*

TK.2144 19 1 1: Determination of the causal organism(s) of black rot in chicory. 1985. G.C. Prinsloo

- *Pests/Plae*

TK.2144/20/1/1: Preliminary survey of parasitic nematode genera in chicory. 1985. R.J. van Wyk

TK.2144/20/1/2: Chemical control of parasitic nematodes in chicory. 1985. R.J. van Wyk

- *Crop science/Gewaskunde*

D.2144/30/1/1: Chicory seed production. 1975. R.S. Marr

D.2144/30/1/2: The chemical control of weeds in chicory. 1975. R.S. Marr

D.2144/30/1/3: Planting and harvesting data for chicory on an Oakleaf-Limpopo. 1980. R.S. Marr

D.2144/30/1/4: The influence of preceding crops on the yield of chicory. 1980. R.S. Marr

D.2144/30/1/5: The evaluation of chicory cultivars. 1975. R.S. Marr

BIOTECHNOLOGY RESEARCH/BIOTEGNOLOGIESE NAVORSING

Cell biology/Selbiologie

MONOCOTYLEDONS/EENSAADLOBBIGES

- *Physiology/Fisiologie*

BP.2211/03/1/1: Monocotyledons: callus en cell culture techniques for maize. 1989. B.R. Woodward

DICOTYLEDONS/TWEESAADLOBBIGES

- *Physiology/Fisiologie*

BP.2212/03/1/1: Dicotyledons: anther culture techniques for groundnuts. 1990. J.A. Brink

BP.2212/03/22/1: Dicotyledons: somatic hybridisation techniques for *Tabacum*. 1990. E.Y. Reinten

BP.2212/03/24/2: Dicotyledons: somatic hybridisation techniques for tomatoes. 1990. E.Y. Reinten

- *Upgrading/Veredeling*

BP.2212/07/8/2: Dicotyledons: selection for resistance to *Phytophthora parasitica* var. *nicotianae* in tobacco. 1990. E.M. Kritzinger

BP.2212/07/17/1: Dicotyledons: utilisation of protoclonal variation in potatoes. 1989. E.Y. Reinten

Molecular biology/Molekulêre biologie

MONOCOTYLEDONS/EENSAADLOBBIGES

- *Genetics/Genetika*

BP.2221/06/2/1: Monocotyledons: identification and isolation of genes for cold tolerance in *Panicum maximum*. 1990. M.M. O'Kennedy

DICOTYLEDONS/TWEESAADLOBBIGES

- *Genetics/Genetika*

BP.2222/06/1/1: Dicotyledons: identification and isolation of structural genes in agronomical crops. 1990. D. Oelofse

BP.2222/06/1/2: Dicotyledons: identification and isolation of genes for drought tolerance in cotton. 1990. A. van der Mescht

BP.2222/06/3/1: Dicotyledons: identification and isolation of genes for drought tolerance in potatoes. 1989. A. van der Mescht

BP.2222/06/3/2: Dicotyledons: identification and isolation of genes for *Fusarium* resistance in potatoes. 1989. C.F. de W. Ries

BP.2222/06/3/3: Dicotyledons: identification and isolation of genes for resistance against *Streptomyces scabies* in potatoes. 1990. H.A.R. Petrick

BP.2222/06/3/6: Dicotyledons: identification and isolation of genes for coat protein of watermelon mosaic virus-2 and watermelon mosaic virus-m. 1990. G.C. Bothma

BP.2222/06/7/1: Dicotyledons: identification and isolation of genes for resistance to *Colletotrichum* in lucerne. 1990. A.L. Kotze

- *Pathology/Patologie*

BP.2222/19/1/1: Dicotyledons: differentiation of *Fusarium oxysporum* isolates that cause potato dry rot, tuber end rot and wilt on the basis of vegetative compatibility and pathogenicity. 1989. S.L. Venter

BP.2222/19/1/2: Dicotyledons: differentiation of *Fusarium oxysporum* isolates that cause tomato wilt on the basis of vegetative compatibility and pathogenicity. 1989. S.L. Venter

DEPARTMENTAL GENE BANKS/DEPARTEMENTELE GENEBAKKE

Horticulture research/Tuinbounavorsing

VEGETABLES AND POTATOES/GROENTE EN AARTAPPELS

- *Crop science/Gewaskunde*

GS.2321/30/1/2: Collection and description of genetic resources of potatoes. 1988. D.C.A. Hoffman

GRAPE VINES/WINGERD

- *Upgrading/Veredeling*

WW.2327/07/1/1: Maintenance and expansion of a grape gene bank. 1988. F.S. de Villiers

HORTICULTURE RESEARCH/TUINBOUNAVORSING

Tuber crops/Knolgewasse

POTATOES/AARTAPPELS

• *Physiology/Fisiologie*

- GS.2411/03/1/1: The influence of calcium on the cell wall and cell structure of potato tubers. 1983. Marianne W. Venter
- GS.2411/03/1/3: Development and evaluation of techniques for determination of heat and cold tolerance of potatoes. 1987. E. Beetge
- GS.2411/03/1/4: Influence of heat stress on the growth and development of potatoes. 1988. J.A. de Jager
- GS.2411/03/1/5: Influence of the post-harvest calcium dip of potato tubers on the keeping quality. 1990. M.V. Venter
- GS.2411/03/2/1: In vitro storage techniques of disease-free mother material of potatoes. 1983. J.L.F. Dutrieux
- GS.2411/03/2/2: Pollen culture in potatoes as a breeding technique. 1983. J.A. Brink
- GS.2411/03/4/1: The evaluation of techniques to determine the physiological age of potato seed tubers. 1987. B.J. Pieterse

• *Nutrition/Voeding*

- GS.2411/05/1/2: Influence of different ratios of potassium: calcium: magnesium on quality and keeping quality of potatoes. 1990. G.C. Bester
- GS.2411/05/1/4: The influence of calcium on potatoes. 1984. M.W. Venter
- GS.2411/05/1/5: The influence of different levels, times and methods of nitrogen top-dressing on potato production and quality. 1981. K.P. Prinsloo

• *Upgrading/Veredeling*

- GS.2411/07/1/1: Breeding of improved potato cultivars. 1983. A.F. Visser
- GS.2411/07/1/2: The breeding of potatoes with tolerance to high temperatures. 1987. H.J. Huysmans
- GS.2411/07/2/1: Breeding and selection of potato cultivars for tolerance to common scab. 1963. L. Marais
- GS.2411/07/2/2: Breeding and selection of potato cultivars for tolerance to bacterial wilt. 1986. A.E. Swanepoel
- GS.2411/07/2/3: Breeding and selection of potato cultivars for tolerance to Fusarium diseases. 1986. P.J. Steyn
- GS.2411/07/2/4: Breeding and selection of potato cultivars for tolerance to virus diseases. 1963. A.F. Visser
- GS.2411/07/3/1: Genetic studies to broaden the genetic base of potato cultivars. 1975. A.F. Visser
- GS.2411/07/4/1: Upgrading of potatoes: utilisation of normal and/or induced protocol variation. 1986. J.M. Lindeque
- GS.2411/07/4/2: Upgrading of potatoes: utilisation of callus and cell suspension culture techniques as a method of selection. 1988. J.M. Lindeque
- GS.2411/07/5/1: Breeding of potatoes cultivars for tolerance to root-knot nematodes (*Meloidogyne* spp.). 1987. P.J. Steyn

- *Pathology/Patologie*

- GS.2411/19/1/2: Study and control of common scab on potatoes. 1978. B.W. Young
- GS.2411/19/1/4: Ecology and control of black scurf on potatoes. 1979. B.W. Young
- GS.2411/19/1/5: Control of silver scurf on potatoes. 1985. L. Marais
- GS.2411/19/1/6: Study of silver scurf on potatoes. 1985. L. Marais
- GS.2411/19/1/8: Study of anthracnose on potatoes. 1985. L. Marais
- GS.2411/19/1/9: Study of *Fusarium* spp. concerned with dry rot and stemrot of potatoes. 1985. D.J. Theron
- GS.2411/19/1/10: Evaluation of fungicides to control *Fusarium* dry rot of potatoes. 1987. D.J. Theron
- GS.2411/19/2/3: Bacterial wilt disease of potatoes: survival of the pathogen. 1988. A.E. Swanepoel
- GS.2411/19/2/4: Identification of the pathogens causing Erwinia wilt of potatoes. 1989. S. Serfontein
- GS.2411/19/2/5: Evaluation of ELISA kits for *Pseudomonas solanacearum* in potatoes. 1989. A.E. Swanepoel
- GS.2411/19/3/4: Effect of tuber stimulation on the detection of potato viruses in tomatoes. 1987. P.J. Prins
- GS.2411/19/3/7: Potato virus Y in potatoes: identification and characterisation of strains. 1983. G.J. Thompson
- GS.2411/19/3/10: Occurrence and epidemiology of potato leaf roll virus and beet western yellows and their strains in potatoes. 1987. G.J. Thompson

- *Pests/Plae*

- GS.2411/20/1/1: Biological studies of black maize beetle in potatoes. 1984. J.M.I. Donaldson
- GS.2411/20/1/2: Bio-ecological studies of the potato snout beetle. 1984. J.M.I. Donaldson
- GS.2411/20/3/1: Evaluation of techniques to determine the tolerance of potatoes to *Meloidogyne* nematodes. 1987. P.J. Steyn

- *Crop science/Gewaskunde*

- GS.2411/30/1/1: Phase-2 evaluation of adaptability of promising potato breeding lines in different areas. 1963. J.L. Schoeman
- GS.2411/30/1/2: Phase-2 evaluation of advanced breeding lines and imported cultivars in different areas. 1979. J.L. Schoeman
- GS.2411/30/1/3: Introduction and preliminary evaluation of foreign potato cultivars. 1973. A.F. Visser
- GS.2411/30/1/4: Evaluation of commercial acceptability of promising potato breeding lines and imported cultivars. 1987. D.C.A. Hoffman
- GS.2411/30/2/12: Optimal plant population for potatoes under irrigation. 1986. J.J. Nel
- GS.2411/30/2/13: The efficiency of diffused light storage as compared to cold storage of potatoes. 1987. E. Beetge
- GS.2411/30/3/1: Maintenance and multiplication of genetic resources of potatoes. 1987. D.C.A. Hoffman

- *Water requirements/Waterbehoefies*

- GS.2411/31/1/2: Water requirements of potatoes and the influence of water regime on biomass and quality. 1987. J.M. Steyn

Vegetables/Groente

TOMATOES/TAMATIES

- *Physiology/Fisiologie*

- GS.2421/03/1/1: Anther culture of tomatoes. 1987. J.A. Brink
- GS.2421/03/1/2: Establishment and embryogenesis of cell cultures of tomatoes. 1987. R.P. de Villiers

- *Upgrading/Veredeling*

- GS.2421/07/1/1: Breeding and selection of market tomatoes. 1975. S.E. Bosch
- GS.2421/07/1/2: Breeding and selection of processing tomatoes. 1975. S.E. Bosch

- *Pathology/Patologie*

- GS.2421/19/2/3: Epidemiology of bacterial spot and speck on tomato seedlings. 1989. J.J. Serfontein
- GS.2421/19/3/1: Identification and characterisation of the potyvirus group in tomatoes. 1981. G.J. Thompson
- GS.2421/19/3/2: Identification and characterisation of tomato spotted wilt virus strains. 1981. G.J. Thompson

- *Pests/Plae*

- GS.2421/20/1/1: A study of plant parasitic eelworm on tomatoes. 1981. K.C. Daiber
- GS.2421/20/1/2: Bio-ecological studies of *Liriomyza trifolii* on tomatoes. 1985. M.C. Bolton

- *Crop science/Gewaskunde*

- GS.2421/30/1/1: Evaluation of new market tomato cultivars and breeding lines. 1975. H.A. Dafel
- GS.2421/30/1/2: Evaluation of processing tomato cultivars and breeding lines. 1975. H.A. Dafel
- GS.2421/30/2/2: Effect of growth regulators on the herbicide sensitivity and yield of tomatoes. 1989. A.G. Comrie
- GS.2421/30/3/1: Maintenance and multiplication of genetic resources of tomatoes. 1987. D.C.A. Hoffman
- GS.2421/30/3/2: Collection and description of genetic resources of tomatoes. 1987. C. Bester

- *Water requirements/Waterbehoefies*

- GS.2421/31/1/2: Water requirements of processing tomatoes. 1986. H.A. Dafel

ONIONS/UIE

- *Upgrading/Veredeling*

- GS.2422/07/2/1: The breeding of F₁-hybrid onions. 1983. Elsa van der Klashorst

- *Pathology/Patologie*

- GS.2422/19/1/1: Study of *Pyrenochaeta terrestris*, the pink root pathogen of onions. 1983. J.F. Ferreira

GS.2422/19/1/2: Post-harvest decay of onions by *Aspergillus niger*: epidemiology and occurrence. 1987. S.P. Naude

GS.2422/19/1/5: Seed-borne diseases of onions: *Alternaria* blotch. 1990. B.H. Boelema

• Crop science/Gewaskunde

GS.2422/30/1/1: Evaluation of onion cultivars and breeding lines. 1977. A.G. Comrie

GS.2422/30/2/2: Planting density of onions. 1986. A.G. Comrie

GS.2422/30/2/3: Cultivation studies with onions predicting yield and quality in onions. 1989. A.G. Comrie

GS.2422/30/3/1: Maintenance and multiplication of genetic resources of onions. 1987. P.O. Stork

GS.2422/30/3/2: Collection and description of genetic resources of onions. 1986. Elsa van der Klashorst

COLE CROPS/KOOLGEWASSE

• Physiology/Fisiologie

GS.2423/03/1/1: The influence of seed treatments on the germination/physiology of cole crops: cabbage. 1984. B.H. Boelema

• Pests/Plae

GS.2423/20/1/1: Study of *Heterodera schachtii* in cole crops. 1987. K.C. Daiber

• Crop science/Gewaskunde

GS.2423/30/1/2: Cole crops: phase-II evaluation of cauliflower cultivars and breeding lines. 1975. C.P.J. Coetzee

GS.2423/30/1/3: Cole crops: phase-II evaluation of broccoli cultivars and breeding lines. 1981. W.P. Stapelberg

GS.2423/30/2/1: Maintenance and multiplication of genetic resources of cole crops. 1987. D.C.A. Hoffman

GS.2423/30/2/2: Collection and description of genetic resources of cole crops: cabbage. 1987. P.J. Henrico

GS.2423/30/2/3: Collection and description of genetic resources of cole crops: cauliflower. 1987. C.P.J. Coetzee

GS.2423/30/2/4: Collection and description of genetic resources of cole crops: broccoli. 1987. A.A. van den Berg

ROOT CROP VEGETABLES/WORTELAGTIGE GROENTE

• Anatomy/Anatomie

GS.2424/02/1/1: Root crop vegetables: anatomical studies of root development in sweet potatoes. 1986. C.P. du Plooy

• Physiology/Fisiologie

GS.2424/03/1/1: Root crop vegetables: physiology of storage root initiation and growth in sweet potatoes. 1986. C.P. du Plooy

- *Upgrading/ Veredeling*

- GS.2424/07/1/1: Root crop vegetables: breeding and selection of sweet potatoes. 1976. C. Bester
- GS.2424/07/1/2: Root crop vegetables: breeding and selection of industrial sweet potatoes. 1975. C. Bester

- *Pathology/ Patologie*

- GS.2424/19/1/1: Root crop vegetables: virus diseases of root crop vegetables: sweet potatoes. 1981. G.J. Thompson

- *Crop science/ Gewaskunde*

- GS.2424/30/1/1: Root crop vegetables: phase-II evaluation of sweet potato cultivars and breeding lines. 1975. A.A. van den Berg
- GS.2424/30/4/1: Maintenance and multiplication of genetic resources of root crop vegetables: sweet potatoes. 1987. P.O. Stork
- GS.2424/30/4/2: Collection and description of genetic resources of root crop vegetables: sweet potatoes. 1987. C. Bester
- GS.2424/30/4/3: Maintenance and multiplication of genetic resources of root crop vegetables: carrots. 1987. P.O. Stork
- GS.2424/30/4/5: Maintenance and multiplication of genetic resources of root crop vegetables: beetroot. 1987. D.C.A. Hoffman
- GS.2424/30/4/6: Collection and description of genetic resources of root crop vegetables: beetroot. 1987. Elsa van der Klashorst

- *Water requirements/ Waterbehoefes*

- GS.2424/31/1/1: Water requirements of root crop vegetables: carrots. 1982. P.F. Nortje

LEGUME VEGETABLES/PEULGROENTE

- *Upgrading/ Veredeling*

- GS.2425/07/2/1: Legume vegetables: breeding and selection of green peas. 1975. S.E. Bosch
- GS.2425/07/2/2: Legume vegetables: breeding and selection of dry peas. 1977. S.E. Bosch

- *Pathology/ Patologie*

- GS.2425/19/1/1: Legume vegetables: a study of halo blight of green beans. 1975. B.H. Boelema

- *Crop science/ Gewaskunde*

- GS.2425/30/2/2: Legume vegetables: phase-II evaluation of dry pea cultivars and breeding lines. 1977. C. Bester
- GS.2425/30/4/1: Maintenance and multiplication of genetic resources of legume vegetables: green beans. 1987. P.O. Stork
- GS.2425/30/4/2: Collection and description of genetic resources of legume vegetables: green beans. 1987. A.A. van den Berg
- GS.2425/30/4/3: Maintenance and multiplication of genetic resources of legume vegetables: peas. 1987. P.O. Stork

- GS.2425/30/4/4: Collection and description of genetic resources of legume vegetables: peas. 1987. C.E. Rappard
- GS.2425/30/5/1: An evaluation of the efficiency and phytotoxicity of herbicides on green beans. 1981. H.A. Dafel

VINE CROPS/RANKGEWASSE

• *Upgrading/Veredeling*

- GS.2426/07/1/1: Vine crop vegetables: breeding and selection of pumpkins. 1976. S.E. Bosch
- GS.2426/07/1/2: Vine crop vegetables: breeding and selection of muskmelon. 1976. J.J.B. van Zijl

• *Crop science/Gewaskunde*

- GS.2426/30/1/1: Vine crop vegetables: evaluation of pumpkin cultivars and breeding lines. 1977. C. Bester
- GS.2426/30/1/2: Vine crops: phase-II evaluation of muskmelon cultivars and breeding lines. 1976. Elsa van der Klashorst
- GS.2426/30/2/1: Weed control studies in pumpkin and squashes. 1982. H.A. Dafel
- GS.2426/30/3/1: Maintenance and multiplication of genetic resources of vine crops. 1987. D.C.A. Hoffman
- GS.2426/30/3/2: Collection and description of genetic resources of vine crops: pumpkins. 1987. Elsa van der Klashorst
- GS.2426/30/3/3: Collection and description of genetic resources of vine crops: muskmelon. 1987. A.G. Comrie
- GS.2426/30/3/4: Collection and description of genetic resources of vine crops: watermelons. 1987. C. Bester

SUNDRY VEGETABLES/DIVERSE GROENTE

• *Physiology/Fisiologie*

- GS.2427/03/1/2: Sundry vegetables: another culture of asparagus (*Asparagus officinalis*). 1989. J.A. Brink
- GS.2427/03/2/1: Sundry vegetables: in vitro propagation of garlic. 1990. C.C. van Rhyn

• *Crop science/Gewaskunde*

- GS.2427/30/2/1: Sundry vegetables: cultivation studies with lettuce. 1983. C.P. du Plooy
- GS.2427/30/2/2: Sundry vegetables: optimisation of lettuce production in the Tala Valley. 1989. H.A. Dafel
- GS.2427/30/3/1: Maintenance and multiplication of genetic resources of sundry vegetables: garlic. 1987. D.C.A. Hoffman
- GS.2427/30/3/2: Collection and description of genetic resources of sundry vegetables: garlic. 1987. P.J. Henrico

CHICORY/SIGOREI

• *Upgrading/Veredeling*

- GS.2428/07/1/1: Breeding of chicory. 1989. C. Bester

- *Pathology/ Patologie*

- GS.2428/19/1/2: Evaluation of chicory cultivars for resistance to black rot. 1987. J.F. Ferreira
 GS.2428/19/1/4: Causes of stubby root in chicory. 1989. J.F. Ferreira

- *Technology/ Tegnologie*

- GS.2428/52/1/1: Calibration of Nir equipment for the determination of fibre content in chicory. 1988. M. Biemond
 GS.2428/52/1/2: Investigation of alternative methods for the evaluation of chicory quality. 1989. M. Biemond

Flowers and ornamental plants/Blomme en sierplante

PROTEAS

- *Physiology/ Fisiologie*

- GS.2431/03/2/1: Rapid multiplication of proteas in vitro: *Leucospermum*. 1986. B.A. Rugge
 GS.2431/03/2/2: Rapid multiplication of proteas in vitro: *Serruria florida*. 1986. B.A. Rugge
 GS.2431/03/2/3: Rapid multiplication of proteas in vitro: *Protea*. 1987. D.I. Ferreira

- *Upgrading/ Veredeling*

- GS.2431/07/1/2: Hybridisation studies with proteas: genus *Protea*. 1985. G.J. Brits
 GS.2431/07/1/3: Mass selection for the upgrading of certain protea variants: genus *Protea*. 1985. G.J. Brits
 GS.2431/07/1/5: Upgrading of proteas as pot plants: genus *Protea*. 1987. G.J. Brits
 GS.2431/07/2/1: Hybridisation studies with proteas: genus *Leucospermum*. 1985. G.J. Brits
 GS.2431/07/2/2: Upgrading of proteas as pot plants: genus *Leucospermum*. 1987. G.J. Brits
 GS.2431/07/3/1: Hybridisation studies with proteas: genus *Leucadendron*. 1986. B.A. Rugge
 GS.2431/07/3/2: Upgrading of proteas as pot plants: genus *Leucadendron*. 1987. G.J. Brits
 GS.2431/07/4/1: Upgrading of proteas as pot plants: genus *Serruria*. 1987. G.J. Brits

- *Pests/ Plae*

- GS.2431/20/1/2: Bio-ecological studies of insects on proteas. 1986. J.H. Coetzee
 GS.2431/20/1/3: Proteas: insects associated with *Protea magnifica* and *Protea laurifolia*. 1988. M.G. Wright
 GS.2431/20/2/1: Taxonomic studies of insects on proteas. 1986. J.H. Coetzee
 GS.2431/20/3/1: Chemical control measures of pests on proteas. 1986. J.H. Coetzee

- *Crop science/ Gewaskunde*

- GS.2431/30/1/2: Evaluation of protea cultivars and selections. 1978. G.J. Brits
 GS.2431/30/2/3: Reproduction of proteas by means of grafting and budding. 1987. D.G. Malan
 GS.2431/30/2/4: Proteas: maximising seed germination percentage in *Leucospermum*. 1988. G.J. Brits

- GS.2431/30/3/2: Cultivation of proteas in inert media. 1987. D.G. Malan
- GS.2431/30/3/3: An investigation into lime tolerant rootstock for proteas. 1987. D.G. Malan
- GS.2431/30/4/1: Maintenance and multiplication of genetic resources of proteas. 1987. G.C. van den Berg
- GS.2431/30/4/2: Collection and description of genetic resources of proteas: genus *Protea*. 1986. G.C. van den Berg
- GS.2431/30/4/3: Collection and description of genetic resources of proteas: genus *Leucospermum*. 1986. G.C. van den Berg
- GS.2431/30/4/4: Collection and description of genetic resources of proteas: genus *Leucadendron*. 1986. G.C. van den Berg
- GS.2431/30/4/5: Collection and description of genetic resources of proteas: genus *Serruria*. 1986. G.C. van den Berg
- GS.2431/30/4/6: Collection and description of genetic resources of proteas: genus *Mimetes*. 1986. G.C. van den Berg
- GS.2431/30/5/2: Proteas: influence of short day cycles on flower induction of *Leucospermum* cv. Red Sunset. 1987. D.G. Malan
- GS.2431/30/5/3: Proteas: influence of flower induction during different times of the year on the time of inflorescence development of *Leucospermum* cv. Red Sunset. 1987. D.G. Malan
- GS.2431/30/5/4: Proteas: influence of partial induction on the development of distal axillary buds on *Leucospermum* cv. Red Sunset shoots. 1987. D.G. Malan
- GS.2431/30/5/5: Prevention of shoot growth cessation in *Leucospermum*. 1987. D.G. Malan
- GS.2431/30/5/6: Proteas: delaying inflorescence development of *Leucospermum*. 1987. D.G. Malan
- GS.2431/30/5/7: Proteas: manipulation of flowering time - improving inflorescence quality in *Leucospermum*. 1988. D.G. Malan
- GS.2431/30/5/8: Proteas: night interruption and the prevention of induction of flower *Leucospermum* cv. Red Sunset. 1987. D.G. Malan
- GS.2431/30/6/1: Proteas: influence of daylength on inflorescence development of *Serruria florida*. 1988. D.G. Malan
- GS.2431/30/7/1: Proteas: inflorescence initiation and development in the genus *Protea*. 1987. D.G. Malan

POT PLANTS/POTPLANTE

• *Physiology/Fisiologie*

- GS.2432/03/1/1: Rapid multiplication of bulb flower pot plants in vitro: *Lachenalia*. 1982. J.G. Janse van Rensburg
- GS.2432/03/1/3: Rapid multiplication of bulb flower pot plants in vitro: *Amaryllis*. 1987. M. de Bruyn
- GS.2432/03/1/4: Rapid multiplication of bulb flower pot plants in vitro: *Crinum*. 1987. M.M. Slabbert
- GS.2432/03/3/1: Bulb flower pot plants: multiple flower formation of *Lapeirousia*. 1988. E. Louw
- GS.2432/03/4/1: Bulb flower pot plants: in vitro storage of *Lachenalia* shoot tips. 1989. E. Louw

• *Upgrading/Veredelings*

- GS.2432/07/1/1: Bulb flower pot plants: breeding and selection of *Lachenalia*. 1974. F.L. Hancke
- GS.2432/07/1/2: Pot plants: breeding and selection of intergeneric hybrids of *Amaryllidaceae*. 1987. A.F. Coertze
- GS.2432/07/2/1: Cytogenetical study of bulb flower pot plants: *Lachenalia*. 1983. F.L. Hancke

• *Pathology/Patologie*

- GS.2432/19/1/1: Identification of the virus diseases of bulb flower pot plants: *Lachenalia*. 1981. J.T. Burger

• *Crop science/Gewaskunde*

- GS.2432/30/2/1: Bulb flower pot plants: manipulation of the flowering and growth period of *Lachenalia*. 1984. L. Meyer
- GS.2432/30/2/2: Pot plants: in vivo vegetative and corm increasing techniques. 1986. L. Meyer
- GS.2432/30/3/1: Maintenance and multiplication of genetic resources of bulb flower pot plants. 1987. P.J. Klesser
- GS.2432/30/3/2: Collection and description of genetic resources of bulb flower pot plants: *Lachenalia*. 1987. F.L. Hancke
- GS.2432/30/3/3: Collection and description of genetic resources of bulb flower pot plants: *Amaryllidaceae*. 1987. A.F. Coertze

CUT FLOWERS/SNYBLOMME

• *Physiology/Fisiologie*

- GS.2433/03/1/3: Rapid multiplication of bulbous cut flowers in vitro: *Gladiolus*. 1983. M. de Bruyn
- GS.2433/03/2/1: Embryo culture studies on bulbous cut flowers: *Gladiolus*. 1984. J.G. Janse van Rensburg
- GS.2433/03/2/3: Embryo culture studies on bulbous cut flowers: *Nerine*. 1987. J.G. Janse van Rensburg
- GS.2433/03/2/4: Embryo culture studies on bulbous cut flowers: *Cyrtanthus*. 1987. J.G. Janse van Rensburg
- GS.2433/03/3/1: In vitro plant generation of bulbous cut flowers: *Nerine*. 1990. J.H. Coetzee
- GS.2433/03/3/2: In vitro plant generation of bulbous cut flowers: *Gladiolus*. 1990. J.H. Coetzee
- GS.2433/03/3/3: In vitro plant generation of bulbous cut flowers: *Ornithogalum*. 1990. J.H. Coetzee

• *Nutrition/Voeding*

- GS.2433/05/1/1: Nutritional needs of bulbous cut flowers: *Ornithogalum*. 1984. A.F. Coertze

• *Upgrading/Veredeling*

- GS.2433/07/1/1: Bulbous cut flowers: breeding and selection of *Ornithogalum*. 1978. F.L. Hancke
- GS.2433/07/1/2: Bulbous cut flowers: breeding and selection of *Gladiolus*. 1983. S.D. Verryn
- GS.2433/07/2/1: Cytogenetical studies of bulbous cut flowers: *Gladiolus*. 1986. S.D. Verryn
- GS.2433/07/3/1: Sterility studies of bulbous cut flowers: *Nerine*. 1986. G. Sorour

• *Pathology/Patologie*

- GS.2433/19/3/1: Identification of the virus diseases of certain bulbous cut flowers: *Ornithogalum*. 1981. J.T. Burger
- GS.2433/19/3/2: Virus elimination by means of chemotherapy and meristem culture in bulbous cut flowers: *Ornithogalum*. 1984. B.M. Vcelar

- *Pests/Plae*

GS.2433/20/4/2: Shrub-like cut flowers: chemical control of *Pachnoda sinuata* on roses. 1987. J.M.I. Donaldson

- *Integrated control/ Geïntegreerde beheer*

GS.2433/23/1/2: Occurrence and integrated control of Western Flower thrips on cut flowers. 1990 J.H. Coetzee

- *Crop science/Gewaskunde*

GS.2433/30/2/2: Cut flowers: manipulation of the flowering and growth period of *Gladiolus*. 1986. L. Meyer

GS.2433/30/2/3: Bulbous cut flowers: evaluation of *Bulbinella* as cut flower. 1987. E. Louw

GS.2433/30/3/1: Maintenance and multiplication of genetic resources of bulbous cut flowers. 1987. P.J. Klesser

GS.2433/30/3/2: Collection and description of genetic resources of bulbous cut flowers: *Ornithogalum*. 1987. F.L. Hancke

GS.2433/30/3/3: Collection and description of genetic resources of bulbous cut flowers: *Gladiolus*. 1987. S.D. Verryen

GS.2433/30/4/1: Bulbous cut flowers: growth and flower development studies of *Gladiolus*. 1990. J.H. Coetzee

GS.2433/30/4/2: Bulbous cut flowers: growth and flower development studies of *Nerine*. 1990. J.H. Coetzee

FYNBOS

- *Physiology/Fisiologie*

GS.2435/03/1/1: Determination of germination requirements of fynbos seed - *Helichrysum vestitum*. 1987. D.G. Malan

GS.2435/03/1/2: Determination of the germination requirements of fynbos: *Helipterum eximium*. 1987. D.G. Malan

- *Pests/Plae*

GS.2435/20/1/1: Fynbos: interactions between *Audouinia capitata* and associated insects. 1988. M.G. Wright

GS.2435/20/1/2: Biology, ecology and control of borers associated with fynbos plant species. 1990. M.G. Wright

- *Crop science/Gewaskunde*

GS.2435/30/1/1: Growth and development patterns of fynbos - *Helipterum eximium*. 1987. D.G. Malan

GS.2435/30/1/2: Growth and development of fynbos: *Rumohra adiantiformis*. 1988. D.G. Malan

Pome and stone fruits/Kern- en steenvrugte

APPLES/APPELS

- *Physiology/Fisiologie*

VV.2441/03/2/3: A test for the occurrence of specific replant diseases of apples. 1982. H.J. van Zyl

- VV.2441/03/3/3: The application of ELISA and RIA methodology for the quantification of endogenous plant hormones in apples. 1989. J.G.M. Cutting
- VV.2441/03/4/2: Effect of different nitrogen sources on the utilisation of nitrogen fertilisers by apples. 1985. J.M. de Villiers
- VV.2441/03/5/3: Ethylene synthesis as a maturity index for apples. 1987. S.J. van Eeden
- VV.2441/03/6/7: The influence of nitrogen and potassium nutrition on the synthesis of organic acids and the incidence of bitterpit in apples. 1983. J.F. de Villiers
- VV.2441/03/6/10: The mechanism of action of rest-breaking agents in apples. 1986. M.S. North
- VV.2441/03/6/11: Control of delayed foliation of apples. 1986. M.S. North
- VV.2441/03/6/12: Optimisation of diphenylamine treatment of apples for control of superficial scald. 1988. S. van Eeden
- VV.2441/03/6/13: Stem en russetting of apples. 1986. H.J. van Zyl

• *Nutrition/Voeding*

- VV.2441/05/2/6: Seasonal distribution of nitrogen and potassium fertilisation for apple trees. 1985. C.M. Olivier
- VV.2441/05/2/7: Effect of nitrogen potassium and phosphate fertilisation practices on the fruit quality of apples. 1985. C.M. Olivier

• *Upgrading/Veredeling*

- VV.2441/07/1/2: Breeding of apple cultivars resistant to scab. 1977. J.H. Acker
- VV.2441/07/1/7: Development of Granny Smith apple plants from callus and single cells for use in mutation breeding. 1985. R.E. Pieterse

• *Pathology/Patologie*

- VV.2441/19/1/2: Investigation of curative and protective characteristics of existing and new fungicides for apple scab control. 1981. W.F.S. Schwabe
- VV.2441/19/1/6: Isolation techniques for collar and root rot pathogens of apples. 1985. W.A. Smit
- VV.2441/19/1/9: Nature and extent of core rot of apples in the Western Cape. 1988. S.L. de Kock
- VV.2441/19/2/2: Etiology of blister bark of apples. 1987. E.L. Mansveldt
- VV.2441/19/2/3: Genomic fingerprints of pseudomads strains on apples. 1989. E.L. Mansveldt
- VV.2441/19/2/4: Bacteriophages of Pseudomads from apple trees. 1981. E.L. Mansvelt
- VV.2441/19/2/5: Introduction and expression of foreign genes in apples and other fruits. 1990. H.J. du Plessis

• *Pests/Plae*

- VV.2441/20/1/3: Bionomics of codling moth on apples. 1982. T.L. Blomefield
- VV.2441/20/1/4: Insecticide bioassays on banded fruit weevil on apples. 1989. B.N. Barnes
- VV.2441/20/1/5: Performance of plant protection chemicals against insect pests on apples. 1989. P.L. Swart
- VV.2441/20/1/6: Cold sterilisation of apples and table grapes of infesting stages on the Natal fruitfly. 1990. P.L. Swart
- VV.2441/20/2/1: Monitoring systems for pest mites and a mite predatory beetle on apples. 1981. J.H. Botha

- VV.2441/20/2/2: Monitoring systems for pest mites and a mite predatory beetle on apples. 1981. M.A. Venter
- VV.2441/20/2/3: Influence of plant protection chemicals on pest mites and their predators on apples. 1989. J.H. Botha
- VV.2441/20/3/1: Survey of the different nematode species occurring in Western Cape apple orchards. 1979. H.J. Hugo
- VV.2441/20/3/2: Chemical control of nematodes attacking apple trees. 1980. H.J. Hugo

• *Crop science/Gewaskunde*

- VV.2441/30/1/1: The planting and maintenance of apple cultivars. 1972. J.V. Hadlow
- VV.2441/30/1/2: Second phase evaluation of apple cultivars in the Western Cape. 1971. P.R. Jolly
- VV.2441/30/3/4: Manipulation of young apple trees in a high density planting. 1990. M.C. Prins
- VV.2441/30/4/1: Fruit size in apples. 1971. O. Bergh
- VV.2441/30/5/1: Performance of apple trees after planting in an orchard. 1990. M.C. Prins
- VV.2441/30/6/2: Effect of grass and leguminous cover crops on the performance of apple trees. 1986. R.E. Harris

• *Water requirements/Waterbehoefte*

- VV.2441/31/1/2: Effect of irrigation scheduling and soil moisture regime on the yield and quality of apples. 1985. W.A.G. Kotze
- VV.2441/31/1/3: Effect of irrigation system, irrigation schedule and soil management on root development of apple tree and utilisation of applied water. 1985. J.H.M. Karsten

• *Meteorology/Weerkunde*

- VV.2441/33/1/3: Apples: development of a model for the calculation of the optimum date of application of rest-breaking materials. 1986. M.S. North
- VV.2441/33/1/4: Effect of artificial shading on yield and fruit quality of apples. 1986. O. Bergh

• *Technology/Tegnologie*

- VV.2441/52/1/4: Effect of ethylene on apple quality during controlled-atmosphere storage. 1987. A.B. Truter
- VV.2441/52/1/5: Influence of conditioning of apples prior to controlled-atmosphere storage on quality after storage. 1988. A.B. Truter
- VV.2441/52/1/6: Evaluation of alternative anti-oxidants for the control of superficial scald of apples. 1990. S.J. van Eeden

• *Chemistry/Chemie*

- VV.2441/53/1/2: Composition and nutritive value of apples. 1984. J.A.G. van Rhyn

PEARS/PERE

• *Physiology/Fisiologie*

- VV.2442/03/1/1: Micro-propagation of pear rootstocks. 1988. L.A. Allerman

- VV.2442/03/2/3: Development of a test for specific replant disease of pears. 1987. S.H. Nolte
- VV.2442 03 5 4: Anatomical study of poor keeping quality of Bon Chretien pears. 1984. P. van der Merwe

• *Nutrition/Voeding*

- VV.2442 05 1 1: Pears: determination of the effect of soil pH and of potassium and nitrogen fertilisation on the growth, yield and fruit quality of pears. 1982. J. Wooldridge

• *Upgrading/Veredeling*

- VV.2442/07/1/1: Breeding of precocious late pear cultivars. 1977. J.H. Acker
- VV.2442 07 1/4: Mutation breeding in vitro of Packham's Triumph pear to develop a compact growth habit. 1985. R.E. Pieterse

• *Pathology/Patologie*

- VV.2442/19/1/2: Factors affecting the development of calyx-end rot of pears. 1985. S.L. de Kock

• *Pests/Plae*

- VV.2442/20/1/1: Chemical control of codling moth on pears. 1977. T.L. Blomefield

• *Crop science/Gewaskunde*

- VV.2442/30/1/1: The planting and maintenance of pear cultivars. 1970. P.F. Louw
- VV.2442/30/1/2: Second phase evaluation of pear cultivars in the winter rainfall area. 1971. P.R. Jolly
- VV.2442/30/2/1: Evaluation of pear rootstocks in the winter rainfall area. 1971. P. van Huyssteen
- VV.2442/30/3/1: Increasing production of pears. 1978. P. van Huyssteen
- VV.2442 30/3/2: Comparison of training systems for pears in the Groot-Drakenstein area. 1983. P. van Huyssteen
- VV.2442/30/6/1: Effect of the characteristics of ridges on the performance of pear trees. 1986. J. Wooldridge

• *Technology/Tegnologie*

- VV.2442/52/1/1: Controlled-atmosphere storage of pears. 1982. A.B. Truter
- VV.2442/52/1/3: Ripening of pears. 1988. T.R. Visagie

PEACHES/PERSKES

• *Physiology/Fisiologie*

- VV.2443 03/4/3: Investigation of the physiological causes of woolliness of peaches. 1983. L.E. Rhode
- VV.2443 03/4/6: Effect of ring barking at pip hardening on fruit development, fruit quality and carbohydrate composition of Culemborg and Armking peach trees. 1968. H. de Villiers
- VV.2443/03/4/7: Anatomy of split and splinterpit of nectarines and peaches. 1990. P. van der Merwe.
- VV.2443 03 5/1: Effect of stress conditions on uptake of nutrient elements by peach seedlings. 1987. A. Rabie

- *Nutrition/Voeding*

- VV.2443/05/1/2: Scheduling of nitrogen application through the irrigation system for peaches (nectarines). 1982. K.D. Fuller
- VV.2443/05/1/4: Rate and depth of nitrogen leaching in peach orchard soils with micro-irrigation. 1984. K.D. Fuller
- VV.2443/05/1/5: Seasonal distribution of nitrogen and potassium fertilisation of peach trees. 1988. M.E. Joubert

- *Upgrading/Veredeling*

- VV.2443/07/1/5: Breeding improved peach and nectarine cultivars that are adapted to the various production areas of South Africa. 1984. J.H. Acker
- VV.2443/07/1/6: Embryo culture of peaches. 1986. L.A. Allerman
- VV.2443/07/1/7: Pollen culture of peaches. 1986. L.A. Allerman

- *Pathology/Patologie*

- VV.2443/19/1/1: Post-harvest decay of peaches in the summer rainfall area. 1988. J.F. Fourie
- VV.2443/19/2/1: Numerical taxonomical investigation and biological control of *Agrobacterium tumefaciens* of peaches. 1978. H.J. du Plessis
- VV.2443/19/2/2: Treatment of peach seed to eliminate *Pseudomonas syringae*. 1990. M.J. Hattingh

- *Pests/Plae*

- VV.2443/20/3/1: Chemical control of nematodes on peaches. 1986. H.J. Hugo

- *Crop science/Gewaskunde*

- VV.2443/30/1/1: The planting and maintenance of peach cultivars. 1970. W.J.C. Smith
- VV.2443/30/1/2: Second phase evaluation of peach cultivars in the Western Cape. 1971. C.W.J. Bester
- VV.2443/30/1/3: Evaluation of desert peach and nectarine cultivars and selections in the summer rainfall region. 1976. L.L. van der Merwe
- VV.2443/30/1/5: Evaluation of peach breeding lines in Natal. 1981. P.C. van Rooyen
- VV.2443/30/1/6: Morphology of peach pollen for cultivar identification. 1986. P. van der Merwe
- VV.2443/30/2/2: Peaches: evaluation of peach rootstocks at Robertson Experiment Farm. 1982. J.D. Stadler
- VV.2443/30/3/3: Comparison of plant and training systems for peaches. 1984. J.D. Stadler
- VV.2443/30/3/4: Comparison of plant and training systems for peaches in the summer rainfall area. 1985. R.A.W. Gardener

- *Water requirements/Waterbehoefies*

- VV.2443/31/1/2: Effect of irrigation scheduling and soil moisture regimes on the yield and quality of peaches (nectarines). 1985. O. Beukes

- *Meteorology/Weerkunde*

- VV.2443/33/1/1: A prediction model for the determining and mapping of winter chilling requirements of peaches. 1988. G.C. Linsley-Noakes

VV.2443/33/1/2: Use of hail nets in high density peach plantings. 1989. R.A.W. Gardner

• *Technology/Tegnologie*

VV.2443/52/1/4: Controlled-atmosphere storage of peaches and nectarines. 1987. A.B. Truter

VV.2443/52/1/5: Influence of post-harvest handling on quality of peaches and nectarines. 1988. T.R. Visagie

VV.2443/52/2/3: Alternative containers for canned peaches. 1986. R. Schroonenberg

VV.2443/52/2/4: Tunnel dehydration of peaches without using sulphur dioxide. 1987. C.F. Hansmann

• *Chemistry/Chemie*

VV.2443/53/1/1: Composition of canned peaches. 1984. J.A.G. van Rhyn

PLUMS/PRUIME

• *Physiology/Fisiologie*

VV.2444/03/2/3: Effect of growth regulators on plums. 1986. O.J. Olivier

VV.2444/03/3/1: Chemical manipulation of fruit set and thinning of plums (prunes). 1984. A.F. Lourens

VV.2444/03/4/3: Relationship between the chemical/biochemical composition of plums and internal breakdown. 1984. S.H. Nolte

VV.2444/03/5/2: Anatomical study of internal breakdown of plums. 1984. P. van der Merwe

• *Nutrition/Voeding*

VV.2444/05/1/1: Determination of the lime requirement of plums. 1982. M.E. Joubert

• *Upgrading/Veredeling*

VV.2444/07/1/1: Breeding of plum cultivars resistant to bacterial spot. 1972. J.H. Acker

VV.2444/07/1/4: Breeding of European plum cultivars. 1990. J.P. Human

• *Pathology/Patologie*

VV.2444/19/1/1: Post-harvest control of fungal disease of plums. 1982. J.F. Fourie

VV.2444/19/1/2: Infection requirements of moulds causing post-harvest decay of plums. 1982. J.F. Fourie

VV.2444/19/1/4: Geographical distribution of moulds causing post-harvest decay of plums. 1982. J.F. Fourie

VV.2444/19/1/5: Etiology of Botrytis rot of plums. 1985. J.F. Fourie

VV.2444/19/1/8: Etiology of bacterial canker of plums. 1985. I.M.M. Roos

VV.2444/19/1/9: Effect of soil reaction to nitrogen nutrition on predisposition of plum trees for bacterial diseases. 1985. C. Human

VV.2444/19/1/12: Isolation and characterisation of genes for pathogenicity in pseudomonads causing diseases on plums. 1987. I.M.M. Roos

VV.2444/19/2/2: Epidemiology of bacterial canker on plums in South Africa. 1981. I.M.M. Roos

VV.2444/19/2/4: Bacterial blister spot of apples. 1983. E.L. Mansvelt

- VV.2444/19/2/5: Effect of soil reaction and nitrogen nutrition on the predisposition of plum trees for bacterial diseases. 1985. C. Human
- VV.2444/19/2/6: Isolation and characterisation of genes for pathogenicity in pseudomonads causing diseases on plums. 1967. I.M.M. Roos
- VV.2444/19/2/7: Differential host x pathogen interactions among cultivars of plums and strains of *Pseudomonads*. 1988. I.M.M. Roos
- VV.2444/19/2/8: Virulence of pathogen strains of bacterial spot disease on plums. 1988. H.J. du Plessis
- VV.2444/19/2/9: Cloning of genes coding for pathogenicity, virulence and avirulence in the pathogen of bacterial spot disease on plums. 1988. H.J. du Plessis
- VV.2444/19/2/10: Production of monoclonal antibodies against *Xanthomonas campestris* pv. *Pruni* and *Pseudomonas syringae* pv. *Syringae* on plums. 1989. C.A. Goodman
- VV.2444/19/2/11: Tissue culture and transformation of plums. 1990. P.W. Vermeulen
- VV.2444/19/2/12: Studies on the interactions between pseudomonads and plum tissue. 1990. A. Oosthuizen
- VV.2444/19/2/13: Genomic sizing of pathogenic pseudomonads on plums. 1990. H.E. Schlagbauer

• *Crop science/Gewaskunde*

- VV.2444/30/1/1: The planting and maintenance of plum cultivars. 1970. L.R. Hose
- VV.2444/30/1/2: Second phase evaluation of plum cultivars in the Western Cape. 1971. C.W.J. Bester
- VV.2444/30/2/1: Evaluation at Bien Donne of imported plum rootstocks. 1971. J.D. Stadler
- VV.2444/30/4/1: Effect of thinning on fruit size and yield of plums. 1982. J.D. Stadler

APRICOTS/APPELKOSE

• *Nutrition/Voeding*

- VV.2445/05/1/1: Effect of pre- and post-planting organic fertilisation on the performance of apricot trees on two training systems. 1982. M.E. Joubert

• *Upgrading/Veredeling*

- VV.2445/07/1/5: Breeding suitable apricot cultivars for the various production areas of South Africa. 1984. J.H. Acker

• *Pathology/Patologie*

- VV.2445/19/2/1: Tissue culture of apricots. 1990. W.T. Oosthuizen
- VV.2445/19/2/2: Selection of apricot tissue resistant to syringomycin. 1990. W.T. Oosthuizen

• *Crop science/Gewaskunde*

- VV.2445/30/1/1: Planting maintenance of apricot cultivars. 1972. W.J.C. Smith
- VV.2445/30/1/2: Second phase evaluation of apricot cultivars in the Western Cape. 1971. C.W.J. Bester
- VV.2445/30/2/1: Evaluation of apricot rootstocks at Robertson Experiment Farm. 1971. J.D. Stadler
- VV.2445/30/3/1: Comparison of training and pruning systems for apricots. 1982. J.D. Stadler

• *Technology/Tegnologie*

- VV.2445/52/1/1: Treating of apricots for drying with sulphur dioxide. 1984. P.C. Fourie
- VV.2445/52/1/2: Quality parameters affecting quality of dried apricots. 1987. P.C. Fourie

CHERRIES/KERSIES

- *Nutrition/Voeding*

VV.2446/05/1/1: Nitrogen fertilisation of cherries. 1986. C. Human

- *Crop science/Gewaskunde*

VV.2446/30/1/1: Second and third phase evaluation of cherry cultivars in the Western Cape. 1977. P.R. Jolly

- *Meteorology/Weerkunde*

VV.2446/33/1/1: Influence of micro-climate on intensity of bacterial canker on cherries. 1985. C. Human

- *Technology/Tegnologie*

VV.2446/52/1/1: Cold storage of cherries. 1988. S.J. van Eeden

VV.2446/52/2/1: Development of a colouring process for cherries. 1988. E. Joubert

Berry fruits/Bessievrugte

BERRIES/BESSIES

- *Nutrition/Voeding*

VV.2451/05/1/1: Berries: effect of differential N and K fertilisation on production of two strawberry cultivars. 1983. C. Human

- *Upgrading/Veredeling*

VV.2451/07/1/1: Berries: utilisation of the genetic variation in strawberries on the octoploid level. 1972. J.P. Human

VV.2451/07/1/4: Breeding of new bramble cultivars. 1971. J.P. Human

- *Crop science/Gewaskunde*

VV.2451/30/1/1: Second and third phase evaluation of strawberries in the Western Province. 1973. J.P. Human

VV.2451/30/1/2: Berries: evaluation of local strawberry selections and imported cultivars in the summer rainfall areas. 1985. L.L. van der Merwe

VV.2451/30/1/3: Berries: evaluation of Rabbit eye and Highbush blueberry selections and cultivars. 1986. G.C. Linsley-Noakes

VV.2451/30/1/4: Berries: evaluation of raspberry cultivars and selections. 1986. G.C. Linsley-Noakes

- *Water requirements/Waterbehoefies*

VV.2451/31/1/1: Berries, effect of soil moisture regime and irrigation system on water use and production of strawberries. 1988. J.H.M Karsten

Viticulture/Wingerdbou

TABLE GRAPES/TAFELDRUIWE

- *Physiology/Fisiologie*

WW.2461/03/1/1: The prevention of the loose berry problem of table grapes. 1980. E.E.H. Wolf

- *Nutrition/Voeding*

WW.2461/05/1/1: Table grapes: fertilisation of Barlinka through drip and microjet irrigation - Hex River Valley. 1972. D. Saayman

- *Upgrading/Veredeling*

WW.2461/07/1/1: The breeding and evaluation of table grape cultivars for the Winter Rainfall Region. 1977. P.J.L. Ellis

WW.2461/07/1/2: The breeding and evaluation of table grape cultivars for the summer rainfall regions. 1956. P.J.L. Ellis

WW.2461/07/1/3: The use of embryo culture in the breeding of table grapes. 1988. P. Burger

WW.2461/07/1/4: Table grapes: a cytogenetic study to the compatibility of *Vitis* species to produce fertile offspring. 1989. T.A. Viljoen

- *Pathology/Patologie*

WW.2461/19/1/2: Chemical control of *Botrytis cinerea* of table grapes. 1972. P.J. de Kock

WW.2461/19/1/3: Effect of climate and phenological stage of the vine on infection of table grapes by *Botrytis cinerea*. 1984. P.J. de Kock

WW.2461/19/1/4: The epidemiology of *Alternaria* on table grapes. 1987. A.E. Swart

WW.2461/19/1/5: Isolation and evaluation of epiphytic bacteria which suppress *Botrytis* on table grapes. 1988. J.H.S. Ferreira

WW.2461/19/1/6: Table grapes: development of experimental methods for the isolation purification and structure elucidation of exo polysaccharides produced by bacteria. 1990. P.J. Pretorius

- *Pests/Plae*

WW.2461/20/1/2: Bio-ecology and control of red spider species (*Acarina: Tetranychidae*) on table grapes in the Western Cape. 1988. A. Schwartz

WW.2461/20/1/3: Chemical control of bud mite on table grapes. 1990. G.F.J. Höppner

WW.2461/20/1/4: Integrated pest management (IPM) of the vine mealybug *Planococcus ficus* Sinoret on table grapes. 1990. A. Schwartz

- *Crop science/Gewaskunde*

VV.2461/30/1/3: Evaluation of table grape cultivars and selections in the Paarl area. 1971. D.C. Uys

WW.2461/30/1/1: Rootstocks for table grapes in the Hex Valley and Klein Karoo. 1972. S.J. le G. Smit

WW.2461/30/1/2: The relative performance of rootstocks for table grape in the Boland/Swartland area. 1972. E.W. le Grange

WW.2461/30/1/3: The relative performance of rootstock cultivars for table grapes in the summer rainfall areas. 1985. J.H. Avenant

WW.2461/30/1/4: Table grapes: the determination of affinity between scion and rootstock by means of electrophoresis. 1989. E.W. le Grange

- WW.2461/30/3/1: The evaluation of pruning methods for table grapes in the northern summer rainfall region. 1986. J.H. Avenant
- WW.2461/30/4/1: Table grapes: optimum plant spacing for Sultanina in the Hex River Valley. 1989. P. Burger

- *Water requirements/Waterbehoefte*

- WW.2461/31/1/1: The effect of different soil moisture regimes on the performance of table grapes cv. Barlinka in the Hex River Valley. 1979. J.L. van Zyl
- WW.2461/31/1/2: The effect of irrigation and cultivation practices on the cracking of berries of table grapes. 1989. A. Fourie

- *Technology/Tegnologie*

- WW.2461/52/1/1: Optimum harvesting stages for table grape cultivars. 1985. Julia C. Laszlo

WINE GRAPES/WYNDRUIWE

- *Physiology/Fisiologie*

- WW.2462/03/1/2: Wine grapes: the effect of different leaf areas on the metabolism and grape composition of *Vitis vinifera* L. cv. Cabernet Sauvignon. 1985. J.J. Hunter

- *Nutrition/Voeding*

- WW.2462/05/1/1: Effect of rootstock on the mineral status of scions. 1981. J.M. Southey
- WW.2462/05/1/3: The effect of application time, quantity and form of N fertilisation on wine grapes: Stellenbosch. 1979. W.J. Conradie
- WW.2462/05/1/5: Comparison between conventional dry fertilisation and fertigation for the nutrition of wine grapes. 1988. W.J. Conradie
- WW.2462/05/1/6: Wine grapes: determination of the N status of vineyard soils and an evaluation of selected analytical methods for predicting the N supplying capacity. 1989. W.J. Conradie
- WW.2462/05/1/7: Wine grapes: the effect of texture organic material and soil management on the N supplying capacity of vineyard soils at different localities in the RSA. 1989. W.J. Conradie
- WW.2462/05/1/8: Wine grapes: a comparative study on zinc absorption by rootstock and scion graft combinations and factors which may induce zinc deficits. 1989. C.G. Volschenk

- *Upgrading/Veredeling*

- WW.2462/07/1/1: Sifting evaluation of new scion cultivars and hybrids for wine grapes: Stellenbosch. 1965. F.S. de Villiers
- WW.2462/07/1/3: Evaluation of compatibility and affinity of rootstocks for scion cultivars of wine grapes. 1975. D. van Schalkwyk

- *Pathology/Patologie*

- WW.2462/19/1/1: Combined chemical control of economic important diseases attacking aerial parts of the grapevine: coastal area. 1976. S.H.Z. Cilliers
- WW.2462/19/1/7: Identification of the organisms of dying arm of wine grapes and the study of their interactions. 1978. J.H.S. Ferreira
- WW.2462/19/1/9: Control of economically important above-ground diseases of wine grapes: Breë River Valley. 1985. S.H.Z. Cilliers
- WW.2462/19/2/3: Control of crown gall in wine grapes. 1981. J.H.S. Ferreira

● *Pests/Plae*

- WW.2462/20/1/1: Chemical control of nematodes in wine grapes. 1980. J.T. Loubser
- WW.2462/20/1/4: Chemical control of margarodes in wine grapes. 1982. C.A. de Klerk
- WW.2462/20/1/6: Grapevine rootstock resistance against lesion (*Pratylenchus* spp.) and dagger (*Xiphinema* spp.) nematodes. 1988. J.T. Loubser
- WW.2462/20/2/1: Chemical control of bud mite on wine grapes. 1979. C.A. de Klerk
- WW.2462/20/2/2: Chemical control of snails on wine grapes. 1979. A. Schwartz
- WW.2462/20/2/7: Determination of the correct application of pesticides for the control of snoutbeetles on wine grapes. 1985. M.W. Siebert
- WW.2462/20/2/8: Biology of the quince borer in wine grapes. 1986. C.F.J. Höppner
- WW.2462/20/2/9: The determination of an economic threshold and economic injury level for snoutbeetles on grapevines. 1988. E. Marais

● *Crop science/Gewaskunde*

- WW.2462/30/1/1: Integration of budding percentage, fertility and shoot vigour into a standard for pruning recommendations for wine grapes. 1979. J.J. Swanepoel
- WW.2462/30/2/1: Optimal crop load of wine grapes under irrigation as well as under dryland conditions in Stellenbosch. 1977. J.M. Southey
- WW.2462/30/2/4: The effect of bud load on the viticultural and oenological performance of wine grapes: Stellenbosch. 1986. A. Meyer
- WW.2462/30/3/1: The effect of soil preparation methods and depths as well as different ameliorants on the soil and the performance of wine grapes: Stellenbosch. 1977. L. van Huyssteen
- WW.2462/30/3/3: Soil ridging to improve soil physical condition and vine response. 1984. P.A. Myburgh
- WW.2462/30/3/4: The mobility of surface-applied liming materials in soil for wine grapes. 1985. T.A. Deist
- WW.2462/30/3/5: Wine grapes: determination of factors causing soil compaction and the prediction of the compactibility of vineyard soils. 1986. L. van Huyssteen
- WW.2462/30/3/6: Interrelationships among soil volume exploited by roots, water and nutrient balances and performance of wine grapes. 1987. J.L. van Zyl
- WW.2462/30/3/7: Protection of structural unstable topsoil in vineyards. 1988. P.J.E. Louw
- WW.2462/30/3/8: Wine grapes: the improvement of soil physical conditions and vine response on a hydromorphic saline soil. 1988. P.A. Myburgh
- WW.2462/30/3/9: Wine grapes: investigation into the maintenance of high infiltration rates of vineyard soils. 1989. P.J.E. Louw
- WW.2462/30/4/3: Wine grapes: herbigation in vineyards through a microjet irrigation system. 1985. J.C. Fourie
- WW.2462/30/4/4: Evaluation of pre-emergence and post-emergence herbicides for wine grapes. 1987. J.C. Fourie
- WW.2462/30/5/5: Relative performance of cultivars for wine grapes in climate region IV: Rawsonville/Slanghoek. 1974. F. Baard
- WW.2462/30/5/7: Relative performance of cultivars for wine grapes in climate region V: Vaalharts. 1973. F.B. Maree
- WW.2462/30/5/11: Relative performance of cultivars for wine grapes: co-operation with the O.I.V. 1975. F.S. de Villiers
- WW.2462/30/5/12: Semi-commercial evaluation of cultivars for wine grapes in different climatic regions. 1986. D. van Schalkwyk
- WW.2462/30/6/1: Relative performance of wine grape rootstocks on Dundee soil: Montagu. 1974. J.M. Southey

- WW.2462/30/6/3: Relative performance of rootstock cultivars for wine grapes under dryland cultivation: Stellenbosch. 1983. J.M. Southey
- WW.2462/30/6/5: Relative performance of rootstock cultivars for wine grapes (Muscat d'Alexandrie) on an Oakleaf/Westleigh soil: Rawsonville. 1982. J.J. Swanepoel
- WW.2462/30/6/6: Relative performance of rootstock cultivars for wine grapes on a sandy soil: Franschhoek. 1982. J.C.D. Theron
- WW.2462/30/6/7: The physiological response and performance of rootstocks for wine grapes to saline environments. 1985. J.M. Southey
- WW.2462/30/7/1: Evaluation of different trellising systems for wine grapes: Lower Orange River. 1982. J.J. Swanepoel
- WW.2462/30/7/2: Determination of optimal plant densities of wine grapes under dryland cultivation: coastal region. 1983. E. Archer
- WW.2462/30/7/3: The evaluation of different trellising systems for wine grapes: Breë River Valley. 1987. F. Baard
- WW.2462/30/8/1: The effect of nursery practices on the survival percentage of grafted vines for wine grapes. 1985. D. van Schalkwyk

• *Water requirements/Waterbehoefte*

- WW.2462/31/1/2: Irrigation and cultivation studies on wine grapes planted on alluvial soil: Oudtshoorn. 1978. J.L. van Zyl
- WW.2462/31/1/3: Wine grapes: effects of irrigation during ripening on the quality of a red grape cultivar. 1985. J.L. van Zyl

DRYING GRAPES/DROOGDRUIWE

• *Physiology/Fisiologie*

- WW.2463/03/1/2: Shifting the optimal ripening stage of raisin grape cultivars with ethephon: Sultana. 1981. E.E.H. Wolf
- WW.2463/03/1/3: The control of excessive vegetative growth of raisin grapes by means of ethephon: Sultana. 1981. J.J. Burnett

• *Upgrading/Veredelings*

- WW.2463/07/1/1: Selection and evaluation of promising commercial drying grape genotypes from the industry and the conservation of the best clonal material. 1973. G.J.J. Albertse
- WW.2463/07/2/1: Evaluation of new table grape crossings regarding their characteristics for drying grapes. 1987. G.J.J. Albertse

• *Crop science/Gewaskunde*

- WW.2463/30/1/1: Semi-commercial evaluation of raisin grape cultivars and clones in different environments. 1982. G.J.J. Albertse
- WW.2463/30/1/2: Relative performance of new cultivars of raisin grapes in the Lower Orange River area. 1983. P.W. Smit
- WW.2463/30/1/3: Sifting evaluation of new raisin grape cultivars: Robertson. 1982. G.J.J. Albertse
- WW.2463/30/1/4: Evaluation of rootstocks for raisin grapes in the Lower Orange River area. 1983. G.N. Wagener
- WW.2463/30/1/5: Evaluation of rootstocks for raisin grapes in the Olifants River area. 1983. E.W. le Grange
- WW.2463/30/1/6: Relative performance of drying grape (raisin) cultivars in the Olifants River area. 1985. G.J.J. Albertse

WW.2463/30/2/1: Determining optimum vine spacing for drying grapes in the Lower Orange River area. 1971. P. Burger

WW.2463/30/2/2: Drying grapes: optimum plant spacing and trellising system for Sultanina at Lutzville. 1989. C.P. Burger

• *Water requirements/ Waterbehoefes*

WW.2463/31/1/1: Studies with regard to irrigation and cultivation practices for raisin grapes (sultana) on a Dundee soil of the Lower Orange River area. 1983. J.L. van Zyl

Oenology/Wynkunde

WINE/WYN

• *Taxonomy/Taksonomie*

WW.2471/01/1/2: Mass spectrometric characterisation of cellular fatty acid profiles of wine yeast strains. 1987. O.P.H. Augustyn

• *Microbiology/Mikrobiologie*

WW.2471/08/1/1: Evaluation of commercially dried yeast and the dehydratability of promising yeast strains. 1975. E.E.J. Simpson

WW.2471/08/1/2: Determination of the oenological properties of wine yeasts. 1982. J.J. Venter

WW.2471/08/1/3: The effect of storage carbohydrates and phospholipid concentrations in wine yeast on fermentation. 1985. E.E.J. Simpson

WW.2471/08/1/5: Wine: interactions between malolactic bacteria and wine yeasts. 1990. P.A. Loubser

WW.2471/08/2/2: Effect of spray residues on fermentation and wine quality. 1981. A. Tromp

WW.2471/08/2/5: The effect of chemical compounds found in must on the transport mechanisms and temperature sensitivity of wine yeasts. 1985. R.P. Tracey

WW.2471/08/2/6: The determination of lipids in grapes and must. 1984. A. Tromp

• *Technology/Tegnologie*

WW.2471/52/1/4: Evaluation of wine-making equipment. 1981. G.W.W. Wagener

• *Chemistry/Chemie*

WW.2471/53/2/1: Short-term international O.I.V. studies into the chemical aspects of wine and other products of the vine. 1977. E.E.J. Simpson

WW.2471/53/2/2: Development of a method for analysis of aroma components in the vapour phase of wine. 1981. O.P.H. Augustyn

WW.2471/53/2/7: Development of a method for the quantitative determination of steroids and related compounds in grapes, must and wine. 1982. A. Tromp

WW.2471/53/2/8: A literature study about the identification and characterisation of optically active aroma compounds in grapes and wine. 1986. B.J. Hough

WW.2471/53/3/1: Wine: enzymatic release of bound terpenes in grapes and musts. 1986. L.H. Strauss

WW.2471/53/4/1: The study of factors that will affect the short-term shelf-life of wines. 1982. C.S. du Plessis

WW.2471/53/4/2: Relationship between terpene compounds in grapes and wine and the quality of wines. 1983. J. Marais

WW.2471/53/4/3: Relationship between total free volatile and potential terpenes and grape and wine quality. 1987. J. Marais

- WW.2471 53 4 4: Relationship between C₁₃-nor-isoprenoids, terpenes and wine quality of ageing Weisser Riesling wines. 1988. J. Marais
- WW.2471 53 4 5: Wine: the identification of characteristic aroma constituents and aroma precursors of *Vitis vinifera* L. cv. Chardonnay. 1987. C.J. van Wyk

BRANDY/BRANDEWYN

• Chemistry/Chemie

- WW.2472, 53 1, 2: Effect of grape cultivar on the character and composition of brandy from different regions. 1987. G.W.W. Wagener

Citrus and subtropical crops/Sitrus- en subtropiese gewasse

CITRUS/SITRUS

• Physiology/Fisiologie

- SS.2481/03/1/2: Development of techniques for pollen cultures of citrus. 1985. J.H. de Lange
- SS.2481/03/2/2: The physiology of the small fruit problem in citrus. 1986. J.G.M. Cutting

• Nutrition/Voeding

- SS.2481/05/1/1: Effect of different liming agents on soil acidity in citrus and avocado orchards. 1980. R.A. Abercrombie
- SS.2481/05/1/2: Macro- and micro-element fertilisation of citrus in the Citrusdal area. 1971. S.F. du Plessis
- SS.2481/05/1/3: Citrus determination of the nutritional requirements of lemons. 1983. T.R. Nieman

• Upgrading/Veredeling

- SS.2481/07/1/4: Development of black spot tolerant citrus. 1985. J.H. de Lange
- SS.2481/07/1/5: Development of citrus tolerant to greening disease. 1985. S.P. van Vuuren
- SS.2481/07/1/7: Development of seedless citrus cultivars by means of irradiation. 1985. P.J.J. van Rensburg
- SS.2481/07/1/8: Development of improved easy peeling citrus cultivars. 1985. P.J.J. van Rensburg
- SS.2481/07/1/9: Development of citrus rootstocks tolerant to salinity. 1985. H.J. Breedt
- SS.2481/07/1/10: Cryopreservation of citrus seed and pollen. 1990. K. Carstens
- SS.2481/07/1/11: Identification of citrus cultivars and selections by means of isoenzyme electrophoresis and restriction fragment length polymorphisms. 1990. K. Carstens

• Pathology/Patologie

- SS.2481/19/1/4: Isolation and control of the greening organism of citrus. 1981. B.Q. Manicom
- SS.2481/19/1/5: Preparation of monoclonal antibodies against *Pseudomonas* isolate in citrus greening. 1987. B.Q. Manicom
- SS.2481/19/1/6: Citrus greening diagnosis. 1990. B.Q. Manicom
- SS.2481/19/2/1: Tristeza mild strain protection of lime and grapefruit citrus cultivars. 1976. S.P. van Vuuren
- SS.2481/19/2/3: Indexing for virus diseases of citrus. 1971. R.P. Collins
- SS.2481/19/2/4: Resistance of bitter seville citrus rootstocks to tristeza. 1969. S.P. van Vuuren

- SS.2481/19/2/5: Rapid indexing for citrus exocortis viroid. 1987. B.Q. Manicom
- SS.2481/19/3/2: Screening for resistance to *Phytophthora* in citrus in the laboratory and the glasshouse. 1987. N.M. Grech
- SS.2481/19/3/3: Control of *Phytophthora* collar and root rot of citrus. 1987. N.M. Grech
- SS.2481/19/4/1: Application of transmissible dwarfing factors in citrus. 1986. S.P. van Vuuren

● *Pests/Plae*

- SS.2481/20/1/5: Control of false codling moth in citrus. 1971. P.J. Newton
- SS.2481/20/1/6: Studies on citrus psylla. 1981. M.A. van den Berg
- SS.2481/20/1/7: Integrated pest control of citrus in the Cape Province. 1985. W.J. du Toit
- SS.2481/20/1/8: Ecology, chemical and biological control of citrus mites. 1985. P.F. Fourie
- SS.2481/20/1/9: Citrus: interaction between the citrus psylla and associated micro-organisms. 1986. M.A. van den Berg
- SS.2481/20/1/11: Integrated control of the white powdery scale, (Hemiptera: Coccidae) on citrus. 1987. T. Brink
- SS.2481/20/1/12: Development of techniques for the chemical control of the citrus psylla on citrus. 1989. V.E. Deacon

● *Crop science/Gewaskunde*

- SS.2481/30/1/1: Rough lemon selections as rootstocks. 1968. H.J. Breedt
- SS.2481/30/1/2: Rootstocks for citrus: navels and Valencias. 1969. H.J. Breedt
- SS.2481/30/1/4: Trifoliata hybrids as rootstocks for citrus: navels. 1980. J.G.J. Maritz
- SS.2481/30/2/5: Citrus cultivars and selections - rose grapefruit. 1978. C.F. Human
- SS.2481/30/2/8: Citrus cultivars and selections - early and late maturing navels. 1977. C.F. Human
- SS.2481/30/2/9: Citrus cultivars and selections - easy peelers. 1972. J. Bredell
- SS.2481/30/2/11: Conservation and evaluation of genetic material. 1984. H.J. Breedt
- SS.2481/30/2/12: Evaluation of citrus scion cultivars and selections: navels, mid-seasons Valencias, lemons, grapefruit and mandarines in the northern Transvaal. 1988. C.F. Human
- SS.2481/30/2/13: Evaluation of citrus scion cultivars and selections: navels, mid-seasons, Valencias, lemons, grapefruit and mandarines in the eastern Transvaal, Friedenheim. 1988. A.P. Vincent
- SS.2481/30/2/14: Evaluation of citrus scion cultivars: navels, mid-seasons, Valencias, lemons, grapefruit and mandarines in the eastern Transvaal, Malelane. 1988. C.F. Human
- SS.2481/30/2/15: Evaluation of citrus scion cultivars: navels, mid-seasons, Valencias, lemons, grapefruit and mandarines in the Eastern Cape Region. 1988. J. Bredell
- SS.2481/30/2/16: Evaluation of citrus scion cultivars and selections: navels, mid-seasons, Valencias, lemons, and mandarines in the western Cape. 1988. C. Smit
- SS.2481/30/7/1: High density planting of citrus - navels, Valencias and grapefruit. 1985. H.J. Breedt
- SS.2481/30/7/2: Dwarfing of citrus trees. 1985. H.J. Breedt
- SS.2481/30/8/1: Fruit size studies of citrus/Clementines. 1985. P.J.J. van Rensburg
- SS.2481/30/8/2: Fruit set studies of citrus: improving of navel fruit set in the western Cape. 1989. C.J. Smit

● *Soil science/Grondkunde*

- SS.2481/32/1/1: Soil physical characteristics playing a limiting role in citrus production. 1990. R.A. Abercrombie

- *Water requirements/Waterbehoefies*

- SS.2481/31/1/1: Water requirements of citrus at Nelspruit. 1968. S.F. du Plessis
- SS.2481/31/1/2: Water requirements of citrus at Addo. 1976. S.F. du Plessis
- SS.2481/31/1/3: Water requirements of citrus with reference to grapefruit in the Malelane area. 1987. S.F. du Plessis
- SS.2481/31/1/4: Water requirements of citrus in the Citrusdal area: navels. 1988. S.F. du Plessis
- SS.2481/31/1/5: Water requirements of citrus in the Addo area: Valencias. 1988. S.F. du Plessis

- *Chemistry/Chemie*

- SS.2481/53/1/1: Enzymatical reactions involved with greening disease in citrus under orchard conditions. 1985. L.J. van Lelyveld
- SS.2481/53/1/2: Enzymatical reactions for greening disease in citrus tissue culture. 1985. L.J. van Lelyveld

PINEAPPLES/PYNAPPELS

- *Physiology/Fisiologie*

- SS.2482/03/1/1: Development of tissue culture techniques for the production of embryonic callus and protoplasts in pineapples. 1984. M. Fitchet

- *Nutrition/Voeding*

- SS.2482/05/1/1: Nutritional requirements of pineapples in the Eastern Cape Region. 1972. D.B. Dalldorf
- SS.2482/05/1/2: Macro-element fertilisation of pineapples in Zululand. 1972. G. Smart

- *Pathology/Patologie*

- SS.2482/19/1/1: Control of Phytophthora damage on pineapples in the Eastern Cape. 1986. D.B. Dalldorf

- *Pests/Plae*

- SS.2482/20/1/1: Preventative and corrective control of soil insects in pineapples. 1986. G.J. Petty
- SS.2482/20/1/3: The possible roll of different pests regarding the occurrence of wilt in pineapples. 1986. P. Willers

- *Crop science/Gewaskunde*

- SS.2482/30/1/6: Plant density and spacing for smooth Cayenne pineapples. 1986. E.R. Dalldorf
- SS.2482/30/1/7: Evaluation of new herbicides for use in pineapples. 1986. E.R. Dalldorf
- SS.2482/30/1/8: Evaluation of flower inductants on pineapples. 1987. D.B. Dalldorf
- SS.2482/30/2/2: Selection and evaluation of smooth Cayenne pineapples in the Eastern Cape. 1988. E.R. Dalldorf

- *Water requirements/Waterbehoefies*

- SS.2482/31/1/1: Influence of irrigation on pineapple production. 1981. A.J. Alberts

- *Technology/Tegnologie*

- SS.2482/52/1/2: Extending the shelf-life of pineapples. 1989. P.C. Fourie

- SS.2482/52/1/3: Temperature requirements of Queen pineapples during overseas shipment. 1990. D.H. Swarts

AVOCADO/AVOKADO

• *Physiology/Fisiologie*

- SS.2483/03/1/5: Radioimmunoassay to determine the hormonal status of alternate bearing avocado trees. 1981. J.G.M. Cutting
- SS.2483/03/3/1: Physiological indicators for the prediction of quality of avocados. 1985. J.P. Bower
- SS.2483/03/3/2: Physiological indicators for the prediction of final harvest date of avocados. 1985. J.P. Bower

• *Nutrition/Voeding*

- SS.2483/05/1/1: Macro- and micro-element requirements of avocados. 1970. T.J. Koen

• *Pathology/Patologie*

- SS.2483/19/1/2: Resistance of avocado cultivars to root rot. 1972. J.A. Herbert
- SS.2483/19/2/1: Identification and control of avocado virus diseases. 1968. S.P. van Vuuren
- SS.2483/19/2/2: Optimisation of methodology and screening of avocado gene bank for avocado sunblotch viroid (ASBV). 1990. E.A. Lewis
- SS.2483/19/3/1: Control of fruit diseases of avocado by means of antagonistic Phylloplane micro-organisms. 1987. B.Q. Manicom

• *Pests/Plae*

- SS.2483/20/1/2: Integrated control of avocado pests with special reference to the heart-shaped scale. 1988. W.J. du Toit
- SS.2483/20/1/3: Biology and control of the coconut bug on avocados. 1989. T. van der Meulen

• *Crop science/Gewaskunde*

- SS.2483/30/1/1: Evaluation of avocado cultivar combinations in Natal. 1985. B.J. Durand

• *Water requirements/Waterbehoefies*

- SS.2483/31/1/1: Water requirements of avocados. 1990. S.F. du Plessis

BANANAS/PIESANGS

• *Physiology/Fisiologie*

- SS.2484/03/2/1: Development of tissue culture techniques for the production of embryogenic callus and protoplasts in bananas. 1985. M. Fitchet
- SS.2484/03/3/1: Influence of climatic factors and water stress on physiological responses of banana. 1986. J.C. Robinson

• *Nutrition/Voeding*

- SS.2484/05/1/1: Optimum leaf analysis for bananas. 1970. B.L. Smit

- *Upgrading/ Veredeling*

SS.2484/07/1/1: The evaluation of promising banana selections. 1968. J.C. Robinson

- *Pests/ Plae*

SS.2484/20/1/1: Nematodes attacking bananas with special reference to the burrowing nematodes. 1972. E.C. Rabie

- *Crop science/ Gewaskunde*

SS.2484/30/1/1: Determination of optimal plant population and spatial arrangements for bananas. 1980. J.C. Robinson

SS.2484/30/1/3: Commercial evaluation of tissue-cultured banana plants. 1987. J.C. Robinson

- *Water requirements/ Waterbehoefes*

SS.2484/31/1/2: A critical comparative evaluation of drip and micro-irrigation for bananas. 1986. J.C. Robinson

- *Technology/ Tegnologie*

SS.2484/52/1/1: Improvement of the shelf-life of bananas. 1975. D.H. Swarts

SS.2484/52/1/2: Controlled-atmosphere storage of bananas. 1983. D.H. Swarts

SS.2484/52/1/3: The effect of cooling rate on the quality of bananas harvested during hot conditions. 1990. D.H. Swarts

DIVERSE SUBTROPICAL FRUITS/ALLERLEI SUBTROPISCHE VRUGTE

- *Anatomy/ Anatomie*

SS.2485/02/1/4: Diverse subtropical fruits: phenology in relation to guava. 1987. R.J. du Preez

SS.2485/02/1/5: Effect of rootstock and climate factors on fruit morphogenesis in granadilla. 1987. A.J. Joubert

SS.2485/02/1/6: Propagation biology of diverse subtropical fruit: the influence of boron on fruit set of mangoes. 1989. W. Schroeder

- *Physiology/ Fisiologie*

SS.2485/03/2/2: Diverse subtropical fruits: development of a shoot tip grafting technique for granadillas. 1985. M. Nel

SS.2485/03/2/3: Diverse subtropical fruits: development of tissue culture techniques for the production of embryonic callus and protoplasts in mangoes. 1985. G.W. de Winnaar

SS.2485/03/2/4: Diverse subtropical fruits: clonal propagation of papayas in vitro. 1985. G.W. de Winnaar

SS.2485/03/2/6: Diverse subtropical fruits: clonal propagation of guavas in vitro. 1988. M. Fitchet

SS.2485/03/2/7: Suspension culture of litchi. 1990. J.E. Vos

SS.2485/03/3/1: Clonal propagation of guava (*Psidium guajava* L.). 1990. C.J. Fourie

- *Nutrition/ Voeding*

SS.2485/05/1/2: Diverse subtropical fruits: macro- and micro-element requirements of guavas. 1981. T.J. Koen

SS.2485/05/1/5: Diverse subtropical fruits: macro- and micro-element requirements of mangoes. 1972. B.L. Smith

• *Upgrading/Veredeling*

SS.2485/07/1/2: Diverse subtropical fruits: breeding and selection of relation to mangoes. 1971. J.C. Snyman

SS.2485/07/1/3: Diverse subtropical fruits: breeding and selection of relation to guavas. 1970. C.P. Welgemoed

SS.2485/07/1/4: Diverse subtropical fruits: breeding and selection of relation to litchis. 1981. A.J. Joubert

SS.2485/07/1/5: Upgrading of maroela. 1982. A.J. Joubert

• *Pathology/Patologie*

SS.2485/19/1/4: Diverse subtropical fruits: control of Malelane dieback in guavas. 1982. N.M.G. Grech

SS.2485/19/1/7: Diverse subtropical fruits: characterisation and control of granadilla virus disease. 1989. R.J. Brand

• *Pests/Plae*

SS.2485/20/1/1: Diverse subtropical fruits: the occurrence and control of known and new pests. 1972. E.A. de Villiers

SS.2485/20/1/3: A study of the white peach scale on granadilla with emphasis on integrated control. 1989. C. Crause

SS.2485/20/1/4: The role of mango bud mite *Aceria mangiferae* (Sayed) in mango misformation. 1990. T.I. Labuschagne

• *Crop science/Gewaskunde*

SS.2485/30/1/3: Diverse subtropical fruits: alternative pruning systems with relation to guavas. 1985. A.J. Alberts

SS.2485/30/1/4: Pruning of diverse subtropical fruits: litchis. 1987. A.J. Joubert

SS.2485/30/1/6: Pruning at different times to manipulating flowering and fruit development of the mango tree. 1990. W. Schroeder

SS.2485/30/2/2: Testing of diverse subtropical fruits in the Winter Rainfall Region. 1989. W.J. Odendaal

SS.2485/30/3/1: To determine the phenological growth cycles and physiological behaviour of the mango tree. 1990. W. Schroeder

• *Water requirements/Waterbehoefes*

SS.2485/31/1/1: Water requirements of diverse subtropical fruit: guavas in the summer rainfall area. 1987. T. Anderson

• *Technology/Tegnologie*

SS.2485/52/1/3: Determination of the optimum harvesting stage of different mango cultivars. 1990. D.H. Swarts

SS.2485/52/1/4: Treatment of litchis with SO² for control of post-harvest decay during and after storage. 1990. D.H. Swarts

OTHER SUBTROPICAL CROPS/ANDER SUBTROPISCHE GEWASSE

• Physiology/Fisiologie

- SS.2486 03 1 2: Other subtropical crops: clonal propagation of pepper in vitro. 1988. M. Fitchet
SS.2486/03/1/3: Suspension culture of coffee. 1990. J.E. Vos

• Nutrition/Voeding

- SS.2486 05 1 1: Other subtropical crops: macro- and micro-element requirements of tea. 1975. B.L. Smith

• Upgrading/Veredeling

- SS.2486/07/1/1: Other subtropical crops: breeding and selection of tea. 1971. J.C. Snyman
SS.2486/07/1/2: Breeding and selection of other subtropical crops: coffee. 1987. A.C. Nel

• Pests/Plae

- SS.2486 20 2 2: Other subtropical crops: integrated control of coffee pests with the emphasis on *Antestiopsis orbitalis* (Westw.). 1986. H. van der Meulen
SS.2486 20 2 3: Integrated control of coffee pests with the emphasises on the white coffee stem borer. 1990. P.S. Schoeman

• Crop science/Gewaskunde

- SS.2486/30/1/1: Planting distances for other subtropical crops with relation to coffee. 1980. K.F.M.T. de Rooster
SS.2486/30/1/2: Alternative trellising systems of pepper in the Levubu area. 1990. A.C. Nel
SS.2486/30/3/1: Diverse subtropical crops: vegetative propagation of *Coffea canephora* and *C. arabica*. 1989. B. Snijder
SS.2486/30/3/2: Other subtropical crops: seed propagation of *Coffea canephora* and *C. arabica*. 1989. B. Snijder

• Meteorology/Weerkunde

- SS.2486/33/1/1: Climate manipulation for other subtropical crops: ginger. 1987. T. Anderson

• Technology/Tegnologie

- SS.2486 52 1 1: Other subtropical crops: effect of field practice and factory processes on black tea quality. 1984. L.J. van Lelyveld

• Chemistry/Chemie

- SS.2486 53 1 1: Other subtropical crops: browning potential of tea clones and seedlings. 1984. L.J. van Lelyveld
SS.2486 53 1 2: Diverse subtropical crops: the role of polyphenols on the quality of tea. 1989. L.J. van Lelyveld

Nut crops/Neutgewasse

NUTS/NEUTE

• Nutrition/Voeding

- SS.2491 05 1 1: Macro- and micro-element requirements of macadamia nuts. 1968. R.A. Abercrombie

- *Pests/ Plae*

- SS.2491/20/1/1: The occurrence and control of pests on nut crops. 1972. E.A. de Villiers
 SS.2491/20/1/3: Integrated control of stink bugs on macadamia nuts. 1990. I.J. Froneman

- *Crop science/ Gewaskunde*

- SS.2491/30/1/2: Testing of pecan nut cultivars. 1971. A.J. Joubert
 SS.2491/30/2/1: Testing of planting distances of macadamia nuts. 1971. J.H. Oosthuysen
 SS.2491/30/2/2: High density planting of macadamia nuts. 1990. E.M. Wiid
 SS.2491/30/3/1: Tree response to pruning and manipulation of nut trees: pecan nut trees. 1987. J.H. Oosthuysen
 SS.2491/30/3/2: Tree response to pruning and manipulation of nut trees: macadamia trees. 1987. J.H. Oosthuysen
 VV.2491/30/1/1: Second phase evaluation of almond cultivars in the Western Province. 1971. E.J. van Zyl
 VV.2491/30/1/2: Nuts: evaluation of pecan nut cultivars in the High- and Middleveld of Transvaal. 1983. T.K. Haulik
 VV.2491/30/1/3: Nuts: second phase evaluation of almond cultivars in the summer rainfall area. 1987. R.A.W. Gardner

Radioisotopes/Radioisotope

RADIOISOTOPY/RADIOISOTOPIE

- *Chemistry/ Chemie*

- VV.24101/53/1/2: Radiochemical separation of ²⁸Mg and ²⁸Al in a radioisotope generator. 1983. H. Gerber

Sundry horticultural crops/Diverse tuinbougewasse

HORTICULTURAL CROPS/TUINBOUGEWASSE

- *Physiology/ Fisiologie*

- GS.24111/03/2/1: Horticultural crops: study of recalcitrant seeds. 1988. J.T. Meynhardt

- *Nutrition/ Voeding*

- VV.24111/05/1/2: Horticultural crops: nitrogen, potassium and boron fertilisation of olives. 1981. K. Bothma
 VV.24111/05/1/3: Horticultural crops: seasonal uptake of mineral nutrients by olive trees. 1987. J.F. de Villiers
 VV.24111/05/3/1: Horticultural crops: seasonal uptake of nutrient elements by kiwi fruit. 1983. J.F. de Villiers
 VV.24111/05/3/2: Horticultural crops: nitrogen and potassium fertiliser requirement of kiwi fruit. 1987. L. Carstens

- *Crop science/ Gewaskunde*

- GS.24111/30/1/1: Chemical weed control studies with the horticultural crop: guayle. 1981. H.A. Dafel

- GS.24/11/30/2/1: Cultivation studies with the horticultural crop: guayle. 1983. H.A. Dafel
- GS.24/11/30/3/1: Evaluation of different cultivars and breeding lines of the horticultural crop guayle under dryland conditions. 1981. H.A. Dafel
- VV.24/11/30/1/1: Horticultural crops: evaluation of imported olive cultivars in the Paarl, Clanwilliam and Robertson areas. 1981. C. Costa
- VV.24/11/30/1/2: Horticultural crops: evaluation of olive mutations and seedlings in the Paarl and Robertson areas. 1982. C. Costa
- VV.24/11/30/1/3: Horticultural crops: evaluation of olive rootstocks in the Paarl and Robertson areas. 1982. C. Costa
- VV.24/11/30/1/11: Horticultural crops: evaluation of prickly pear cultivars and selection for the Transvaal. 1987. T.K. Haulik
- VV.24/11/30/2/1: Horticultural crops: planting and training systems for olives. 1982. C. Costa
- VV.24/11/30/2/2: Horticultural crops: crop control of olives in the Paarl area. 1982. C. Costa
- VV.24/11/30/5/1: Horticultural crops: evaluation of cultivars and selections of dates. 1984. C.W.J. Bester
- VV.24/11/30/7/1: Second phase evaluation of fig cultivars in the Western Province. 1974. E.J. van Zyl
- VV.24/11/30/8/1: Horticultural crops: second and third phase evaluations of kiwi fruit cultivars in the western and southern Cape. 1977. G.C. Linsley-Noakes
- VV.24/11/30/8/2: Horticultural crops: second and third phase evaluation of kiwi fruit cultivars and selections in the summer rainfall area. 1985. L.L. van der Merwe
- VV.24/11/30/10/2: Horticultural crops: artificial rest breaking of kiwi fruit by climatological and chemical manipulation. 1984. G.C. Linsley-Noakes
- VV.24/11/30/11/2: Morphogenetic and potential study of the prickly pear fruit. 1986. A.B. Wessels

• *Water requirements/Waterbehoefte*

- VV.24/11/31/3/1: Horticultural crops: consumptive water use of kiwi fruit. 1988. O. Beukes

• *Technology/Tegnologie*

- VV.24/11/52/1/2: Horticultural crops: processing methods of olives. 1988. P.C. Fourie
- VV.24/11/52/3/1: Horticultural crops: effect of physical variables during fermentation and drying on rooibos tea quality. 1990. E. Joubert

• *Chemistry/Chemie*

- VV.24/11/53/1/1: Horticultural crops: chemical composition of kiwi fruit. 1988. J.A.G. van Rhyn
- VV.24/11/53/2/1: Horticultural crops: chemical changes during processing of rooibos tea. 1990. E. Joubert

PLANT PROTECTION RESEARCH/PLANTBESKERMINGSNAVORSING

Entomology/Zoology/Insektekunde/Dierkunde

INSECTS/INSEKTE

• *Taxonomy/Taksonomie*

- PB.2511/01/1/1: Collection of southern African insects. 1910. G.L. Prinsloo
- PB.2511/01/1/5: Taxonomy of parasitic wasps, Chalcidoidea. 1970. G.L. Prinsloo
- PB.2511/01/1/7: Taxonomy of Neuroptera. 1977. M.W. Mansell

- PB.2511/01/1/9: Taxonomy of Hymenoptera Aculeata. 1978. C.D. Eardly
- PB.2511/01/1/10: Taxonomy of Cicadellidae of southern Africa. 1973. G.L. Prinsloo
- PB.2511/01/1/11: Taxonomy and distribution of weevils (Curculionidae) in southern Africa. 1985. R.G. Oberprieler
- PB.2511/01/1/12: Taxonomy and distribution of Aphidoidea and Coccoidea in southern Africa. 1985. I.M. Millar
- PB.2511/01/1/13: Taxonomy and distribution of the Chrysomeliodea in southern Africa. 1989. E. Grobbelaar

• *Pests/Plae*

- PB.2511/20/1/1: Migratory locust control by aerial spray application. 1981. H.D. Brown
- PB.2511/20/1/2: The outbreak dynamics of the African migratory locust. 1981. H.D. Brown
- PB.2511/20/1/4: Insects: the optimum volume rate for effective control of the brown locust. 1990. C.F. Kriel
- PB.2511/20/2/1: Insects: predators of the harvester termite, *Hodotermes mossambicus*. 1984. Anette Nel
- PB.2511/20/2/3: Insects: evaluation of insecticides for use in baits against the harvester termite. 1985. Anette Nel
- PB.2511/20/2/4: Aspects of the population dynamics of the harvester termite *Hodotermes mossambicus* in the Bloemfontein district. 1985. Anette Nel
- PB.2511/20/2/5: The effect of termites on the natural veld in the Bloemfontein district. 1986. Anette Nel
- PB.2511/20/2/6: Insects: food preference of harvester termites and possible bait improvement. 1987. F.D. Duncan

• *Biological control/Biologiese beheer*

- PB.2511/22/2/1: The use of natural enemies to control stalk borers in cereal crops. 1978. A.R. Kfir
- PB.2511/22/3/1: Development of a computerised data system for insect pests and their natural enemies. 1983. H. van Hamburg
- PB.2511/22/3/2: Handling and regulation of imported natural enemies of insect pests under quarantine conditions. 1983. H. van Hamburg

• *Integrated control/Geïntegreerde beheer*

- PB.2511/23/1/2: The effect of pesticides applied under field conditions against *H. armiger* on natural enemies and red spider mite. 1978. J.D. Mohr
- PB.2511/23/1/5: The use of natural enemies to control *H. armiger*. 1978. H. van Hamburg
- PB.2511/23/3/1: Evaluation of insecticides against insects which attack the spineless cactus. 1983. M.W. Pretorius

NEMATODES/AALWURMS

• *Taxonomy/Taksonomie*

- PB.2512/01/1/1: Collection of nematodes in southern Africa. 1962. Esther van den Berg
- PB.2512/01/1/3: Taxonomy of root-knot nematodes, *Meloidogyne* spp. 1981. K.P.N. Kleynhans
- PB.2512/01/1/4: Taxonomic study of the South African Longidoridae. 1976. Esther van den Berg

MITES/MYTE

• *Taxonomy/Taksonomie*

- PB.2513/01/1/1: Collection of mites of agricultural importance. 1959. Magdalena K.P. Meyer

- PB.2513/01/1/2: Taxonomy and biology of predacious mites in South Africa. 1962. E.A. Ueckermann
 PB.2513/01/1/3: Taxonomy of free-living Acari in South African soils. 1976. Magdalena K.P. Meyer

• *Integrated control/ Geïntegreerde beheer*

- PB.2513/23/1/1: Integrated control of spider mite species of agronomic crops. 1986. N.C.J. Basson

SPIDERS/SPINNEKOPPE

• *Taxonomy/Taksonomie*

- PB.2514/01/1/1: Taxonomy of agriculturally important spiders. 1976. A.S. Dippenaar

HONEY-BEE/HEUNINGBY

• *Nutrition/Voeding*

- PB.2516/05/1/2: Nectar and pollen flora of South Africa. 1969. M.F. Johannismeier
 PB.2516/05/1/3: The effect of *Drosophila* spp. on the nectar supply of eucalyptus flowers. 1983. A.P. du Toit

• *Upgrading/Veredeling*

- PB.2516/07/1/1: The selection of improved breeding lines of honey-bees. 1972. R.H. Anderson

• *Pathology/Patologie*

- PB.2516/19/1/1: Diseases of the adult honey-bee. 1976. B. Buys

• *Pests/Plae*

- PB.2516/20/1/1: Control of the Argentine ant at bee hives. 1988. B. Buys

• *Behavioural studies/Gedragstudies*

- PB.2516/28/1/1: The behaviour of honey-bees in orchards during pollination. 1972. R.H. Anderson

• *Pollination/Bestuiwing*

- PB.2516/29/1/1: The effect of honey-bees on sunflower pollination. 1985. A.P. du Toit

STORED GRAIN/OPGEBERGDE GRAAN

• *Pests/Plae*

- PB.2518/20/1/4: The biology, distribution and identification of the genera *Trogoderma* and *Phradonoma* (Coleoptera: Dermestidae) in stored grain in South Africa. 1987. M. Jonsson
 PB.2518/20/1/5: Integrated control of moth pests of stored grain in bags. 1990. J. Schmidt

FOREST AND TIMBER/BOSBOME EN TIMMERHOUT

• *Pests/Plae*

- PB.2519/20/1/1: The biology, fungal associations and control of bark beetles on pine trees. 1979. G.D. Tribe

- PB.2519/20/1/3: The biology, pest status and control of the black pine aphid. 1977. N.J. van Rensburg
- PB.2519/20/1/4: Forest and timber: the biology of the pine woolly aphid. 1982. A.J. Urban
- PB.2519/20/1/5: Forest and timber: the biology and behaviour of natural enemies of pine aphids. 1984. J.F. Kirsten
- PB.2519/20/1/7: Forest and timber: biology and control of beetle pests of *Eucalyptus* spp. 1984. G.D. Tribe
- PB.2519/20/1/8: The biology of insect pests of furniture timber plantations. 1986. J.F. Morrison
- PB.2519/20/1/9: The ecology and control of termites in forestry plantation. 1987. P.R. Atkinson

Plant pathology/Microbiology/Plantpatologie/Mikrobiologie

FUNGI/SWAMME

• Taxonomy/Taksonomie

- PB.2521/01/1/1: Identification of diverse fungi. 1973. A.P. Baxter
- PB.2521/01/1/7: Fungi: expansion and maintenance of the National Collection of Fungi: culture collection. 1989. C. Roux
- PB.2521/01/1/8: Fungi: expansion, maintenance and computerisation of the National Collection of Fungi: dried collection (PREM). 1989. A.P. Baxter
- PB.2521/01/2/1: Taxonomy of Ascomycetes: ontogeny of certain loculoascomycetes. 1988. E.J. van der Linde
- PB.2521/01/3/1: Fungi: conidrogenesis of the Coelomycetes in South Africa. 1989. C. Roux
- PB.2521/01/4/1: Fungi: morphology and taxonomy of *Ganaderma* species in South Africa. 1989. A.P. Baxter
- PB.2521/01/5/1: Fungi: taxonomy of *Penicillium* species in South Africa. 1989. A.L. Schutte
- PB.2521/01/6/1: Fungi: an annotated list of rusts in South Africa. 1989. M. van Reenen
- PB.2521/01/7/1: Fungi: chemotaxonomy of *Pythium* spp. 1990. W.J. Botha
- PB.2521/01/7/2: Chemotaxonomy of *Phytophthora* spp. 1990. W.J. Botha

• Mycology/Mikologie

- PB.2521/11/1/1: Examination of diverse feeds for toxigenic fungi. 1978. C. Roux
- PB.2521/11/1/2: Role of toxigenic fungi in the occurrence of hepatogenous photosensitivity in livestock. 1971. C. Roux

• Pathology/Patologie

- PB.2521/19/1/2: Seed-borne fungi of dry beans. 1982. A.P. Baxter
- PB.2521/19/5/2: Factors affecting sporulation infection and disease development by the fungus *D. dematioidea*. 1985. Sharon L. von Broembsen
- PB.2521/19/5/3: Control of pin cushion blight caused by the fungus *D. dematioidea*. 1986. Sharon L. von Broembsen
- PB.2521/19/6/1: Epidemiology of diseases caused by fungi of the genus *Rhizoctonia*. 1987. A.J.L. Phillips
- PB.2521/19/6/2: Biology of fungi of the genus *Rhizoctonia*. 1987. A.J.L. Phillips
- PB.2521/19/6/3: Evaluation of possible methods for control of diseases caused by *Rhizoctonia*. 1987. A.J.L. Phillips
- PB.2521/19/7/4: Fungi: the role of *Fusarium* in crop rotation systems in the Winter Rainfall Region. 1990. S.C. Lamprecht

- PB.2521/19/7/5: Fungi: a comparative study of *Fusarium graminearum* Gr. I and *F. graminearum* Gr. 2. 1990. S.C. Lamprecht
- PB.2521/19/9/1: Fungi: etiology of *Colletotrichum* diseases of different crops in South Africa with special reference to legumes in the pasture conversion scheme. 1990. S.H. Koch
- PB.2521/19/9/2: Fungi: epidemiology of *Colletotrichum* diseases of different crops in South Africa with special reference to legumes in the pasture conversion scheme. 1990. S.H. Koch
- PB.2521/19/11/1: Fungi: the isolation and identification of *Pythium* species with special reference to *Pythium* species involved with damping-off of lucerne seedlings. 1990. S. Denman
- PB.2521/19/11/2: Fungi: environmental factors associated with *Pythium* damping-off lucerne seedlings. 1990. S. Denman
- PB.2521/19/11/3: Fungi: the evaluation of possible control methods of *Pythium* damping-off of lucerne. 1990. S. Denman

BACTERIA/BAKTERIEë

• Nitrogen fixation/Stikstofbinding

- PB.2522/09/1/1: Testing of commercial bacterial inoculants for legumes. 1967. J.L. Staphorst
- PB.2522/09/1/2: Selection of *Rhizobium* bacteria for inoculants. 1968. C.J. Otto
- PB.2522/09/1/9: Application of nitrogen fixing bacterial inoculants to legumes through irrigation systems. 1983. J.L. Staphorst
- PB.2522/09/1/10: Development of immunological methods for quality control of legume inoculants containing bacteria. 1985. H.H. Lochner
- PB.2522/09/1/11: Bacteria: possible utilisation of liquid *Rhizobium* inoculant. 1985. C.J. Otto
- PB.2522/09/1/12: Bacteria: investigation of problems experienced with inoculation of pasture legumes. 1985. J.L. Staphorst
- PB.2522/09/1/13: Bacteria: investigation of problems experienced with inoculation of grain legumes. 1985. J.L. Staphorst
- PB.2522/09/1/15: Bacteria: role of lectins in the *Rhizobium*-legume symbiosis. 1986. I.J. Law
- PB.2522/09/1/17: Bacteria: determination of possible genetic changes between soil isolates and laboratory cultures of *Bradyrhizobium* sp. (Lotus). 1986. H.H. Lochner

• Pathology/Patologie

- PB.2522/19/1/1: Identification and control of bacterial pathogens of crops from various regions and institutes. 1979. C.C.P.R. Deschodt
- PB.2522/19/1/2: Elimination of seed-borne bacterial pathogens from bean seed. 1974. C.C.P.R. Deschodt
- PB.2522/19/1/3: Bacteria: identification and elimination of bacterial pathogens from soybean cultivars. 1985. C.C.P.R. Deschodt
- PB.2522/19/1/4: Bacteria: identification and elimination of bacterial pathogens from *Brassica* sp. 1985. C.C.P.R. Deschodt
- PB.2522/19/1/6: Bacteria: survey of bacterial pathogens on pasture legumes and determination of host range. 1986. C.C.P.R. Deschodt

• Biological control/Biologiese beheer

- PB.2522/22/1/1: Bacteria: isolation, identification and biotyping of *Agrobacterium* spp. from plants and soil. 1985. F.G.H. van Zyl
- PB.2522/22/1/2: Bacteria: the determination of agrocin production and sensitivity of local pathogenic and non-pathogenic *Agrobacterium* species. 1985. F.G.H. van Zyl

- PB.2522/22/1/3: Bacteria: the evaluation of D286 as control strain for crown gall where K84 appears to be unsuccessful. 1985. F.G.H. van Zyl
- PB.2522/22/1/4: Bacteria: the role of competition and specificity of the plant cell binding sites in the biological control of crown gall. 1985. J.L. Staphorst
- PB.2522/22/1/5: Bacteria: the role of agrocin in the biological control of crown gall. 1985. J.L. Staphorst
- PB.2522/22/1/6: Bacteria: the determination of factors in the Boland that is responsible for the possible suppression of crown gall on grapevine. 1985. F.G.H. van Zyl
- PB.2522/22/1/7: Development of agrocin producing strains of *Agrobacterium tumefaciens*. 1984. J.L. Staphorst

VIRUSES/VIRUSSE

• Virology/Virologie

- PB.2523/12/1/3: Development of immunological virus detection procedures for grapevine diseases. 1985. D.J. Engelbrecht
- PB.2523/12/1/4: Development of nucleic acid coupled virus detection procedures for grapevine diseases. 1985. R. Human
- PB.2523/12/1/5: Detection and identification of seed-transmitted viruses in soybeans. 1985. G. Pietersen
- PB.2523/12/1/8: Expansion and maintenance of a plant virus anti-serum bank. 1990. G. Pietersen
- PB.2523/12/1/9: Investigation into plant virus problems identified by the agricultural sector. 1990. G. Pietersen
- PB.2523/12/1/10: Detection and identification viruses of legumes. 1989. G. Pietersen
- PB.2523/12/1/11: A molecular study of a South African isolate of soybean mosaic virus as a model of the potyvirus group. 1990. G. Pietersen

FOREST AND TIMBER/BOSBOME EN TIMMERHOUT

• Pathology/Patologie

- PB.2525/19/1/6: Integrated control of forest tree diseases. 1983. A.E. Lundquist
- PB.2525/19/2/1: Forest and timber: pathogenicity host range and spread of *Verticicladiella* spp. causing root diseases of pines. 1985. M.J. Wingfield
- PB.2525/19/5/1: Forest and timber: host range, pathogenicity and distribution of *Mycosphaerella* needle disease of pines. 1986. M.J. Wingfield
- PB.2525/19/10/2: Forest and timber: routine diagnosis of forest tree diseases in the Cape Province and Natal. 1985. M.J. Wingfield

PASTURE CROPS/WEIDINGSGEWASSE

• Pathology/Patologie

- PB.2526/19/1/9: Pasture crops: seed-borne fungal pathogens and disease transmission by seed of *Medicago* spp. 1986. S.C. Lamprecht
- PB.2526/19/1/10: Pasture crops: survival and infection of *Fusarium avenaceum* on annual *Medicago* spp. 1986. S.C. Lamprecht
- PB.2526/19/1/11: Pasture crops: the role of *Fusarium* in a wheat-medic crop rotation system. 1986. S.C. Lamprecht
- PB.2526/19/1/13: Pasture crops: assessment of disease resistance of cultivated lucerne cultivars to above and below ground pathogens in South Africa. 1986. S.C. Lamprecht

Electron microscopy/Elektronmikroskopie

ELECTRON MICROSCOPY/ELEKTRONMIKROSKOPIE

- *Technology/Tegnologie*

- PB.2541/52/1/1: Preparation and examination of biological specimens by electron microscopy. 1979. H.J. van Tonder

Weed research/Onkruidnavorsing

WEEDS/ONKRUIDE

- *Physiology/Fisiologie*

- PB.2551/03/1/1: Physiology of veld invader weeds' seed germination. 1981. P.L. Campbell
PB.2551/03/2/2: Eco-physiology of jointed cactus (*Opuntia aurantiaca*). 1984. S. Naser

- *Chemical control/Chemiese beheer*

- PB.2551/21/1/1: Chemical control of the weed jointed cactus (*Opuntia aurantiaca*). 1960. H.G. Zimmermann
PB.2551/21/1/3: Chemical control of the weed mesquite (*Prosopis* spp.). 1983. G.B. Harding
PB.2551/21/1/4: Chemical control of alien veld invaders in Natal. 1983. D.J. Erasmus
PB.2551/21/1/5: Chemical control of invader weeds of localised Eastern Cape areas. 1983. B.D. Viljoen
PB.2551/21/1/7: Chemical control of important weeds and unwanted plants in plantations. 1988. R.P. Denny
PB.2551/21/1/8: Chemical control of the weed silver leaf bitterapple (*Solanum elaeagnifolium*). 1988. B.D. Viljoen

- *Biological control/Biologiese beheer*

- PB.2551/22/1/4: Biological control of the weed prickly pear (*Opuntia ficus-indica*). 1960. H.G. Zimmermann
PB.2551/22/1/5: Biological control of the weed *Lantana camara*. 1972. C.J. Cilliers
PB.2551/22/1/6: Biological control of the weeds *Hakea sericea*, *H. gibbosa* and *H. sauveolens*. 1972. R.L. Kluge
PB.2551/22/1/8: Biological control and management of cactus weeds, particularly jointed cactus in South Africa. 1977. S. Naser
PB.2551/22/1/10: Biological control of the weed *Solanum mauritianum* (bugweed). 1988. S. Naser
PB.2551/22/1/12: Biological control of the weed silver leaf bitterapple (*Solanum elaeagnifolium*). 1985. H.G. Zimmermann
PB.2551/22/1/11: Biological control of undesirable Australian *Acacia* weeds. 1988. G.B. Dennill
PB.2551/22/1/13: Biological control of the weed *Chromolaena odorata* using natural insect enemies. 1988. R.L. Kluge
PB.2551/22/1/15: Biological control of the weed spear thistle (*Cirsium vulgare*). 1988. D.J.R. Noel
PB.2551/22/1/16: Biological control of the weed *Prosopis*. 1988. H.G. Zimmermann
PB.2551/22/1/17: Biological control of important aquatic weeds. 1988. C.J. Cilliers
PB.2551/22/1/18: Biological control of diverse weeds by means of mites. 1989. C. Creamer

- PB.2551/22/1/18: Biological control of the weed silver leaf bitterapple (*Solanum elaeagnifolium*). 1985. H.G. Zimmermann
- PB.2551/22/2/1: A study of the diseases of some indigenous and exotic weeds which are caused by local pathogens. 1979. M.J. Morris
- PB.2551/22/2/2: Biological control of *Acacia* weeds by means of pathogens. 1982. M.J. Morris
- PB.2551/22/2/5: Biological control of diverse weeds with the aid of pathogens. 1988. M.J. Morris

• *Integrated control/ Geïntegreerde beheer*

- PB.2551/23/1/1: Integrated control of the weed *Opuntia aurantiaca* (jointed cactus). 1986. L. Henderson

• *Plant geography/ Plantgeografie*

- PB.2551/25/1/1: A survey of alien invasive trees and shrubs in the grassland and savanna biomes. 1986. L. Henderson

• *Ecology/ Ekologie*

- PB.2551/27/1/2: Ecology of the weed nassella tussock (*Stipa trichotoma*). 1983. B.D. Viljoen
- PB.2551/27/1/3: Ecology of the weed *Prosopis* spp. 1988. G.B. Harding
- PB.2551/27/1/10: Reproductive ecology of the weed *Acacia mearnsii*. 1988. P.J. Pieterse

PESTICIDES/PLAAGDODERS

• *Physiology/ Fisiologie*

- PB.2552/03/1/2: Effect of pesticide breakdown in soils on phytotoxicity. 1984. E.R.I.C. Sandmann
- PB.2552/03/1/3: A study of climatic factors potentiating pesticide phytotoxicity in legumes. 1984. E. van Rensburg
- PB.2552/03/1/5: The effect of sub-lethal concentrations phenoxy herbicides on the growth and development of tomato fruit. 1989. F. Zuhlsdorff
- PB.2552/03/1/6: Determination of the threshold value for and physiological mechanisms of hormone herbicides in vegetable crops. 1988. L.M. Jordaan

• *Biotesting/ Biotoetsing*

- PB.2552/24/1/2: The use of plant cells and plant tissue culture to determine herbicide concentrations. 1985. J.L. Graaf
- PB.2552/24/2/1: The use of the ELISA technique to determine pesticides with auxin mode of action in plants and water. 1989. F. Zuhlsdorff

• *Technology/ Tegnologie*

- PB.2552/52/1/3: Study of physical characteristics of pesticide formulations. 1980. H.A. Abott
- PB.2552/52/1/4: The role of adjuvants in the penetration and effectiveness of pesticides. 1985. L.P. van Dyk
- PB.2552/52/1/5: The role of leaf surfaces in the effectiveness of adjuvants and pesticides. 1986. M.J. York

• *Chemistry/ Chemie*

- PB.2552/53/1/4: Pesticide residues in raw vegetables, fruit and animal products. 1977. L.P. van Dyk
- PB.2552/53/1/5: Analysis of pesticides and their residues affecting useful plants. 1983. P. Niewoudt
- PB.2552/53/1/6: Research and improvement of pesticide analysis done by the WGPA. 1984. P.R. de Beer
- PB.2552/53/1/7: Development of confirmation techniques for pesticide residue analysis. 1985. Marelle Krause

ANIMAL PRODUCTION PROMOTION DIEREPRODUKSIEBEVORDERING

ANIMAL PRODUCTION AND ANIMAL PRODUCTS RESEARCH DIEREPRODUKSIE- EN DIEREPRODUKTENAVORSING

Animal production/Diereproduksie

BEEF CATTLE/VLEISBEESTE

- *Reproduction/Reproduksie*

- VS.3111/04/1/1: Reproduction in beef cattle: biochemical interrelationships during nutritional stress. 1984. G.W. Kay

- *Upgrading/Veredelings*

- VS.3111/07/1/1: Evaluation of beef bulls in upgrading: Bonsmara. 1980. D.J. Bosman
- VS.3111/07/1/2: Beef cattle: evaluation of the Roodebos and Wesselsvlei Bonsmara breeding lines. 1982. D.J. Bosman
- VS.3111/07/1/3: Upgrading studies on beef cattle - improving fertility by natural selection. 1984. M.M. Scholtz
- VS.3111/07/1/4: Upgrading studies on beef cattle: the effects of selection for growth under different management systems on production efficiency. 1985. J. van der Westhuizen
- VS.3111/07/1/6: Upgrading studies on beef cattle: the influence of the simulation of natural selection of body mass and fertility in a large beef breed. 1985. M.M. Scholtz
- VS.3111/07/1/7: Beef cattle: prediction of breeding values and quantification of genetic trends using mixed model procedures. 1985. C. Hunlun
- VS.3111/07/1/8: Upgrading studies on beef cattle - the estimation of brain mass by using head measurements of cattle and rats. 1985. H.E. Theron
- VS.3111/07/1/9: Upgrading of beef cattle: genetic relationship between certain production traits on different nutritional and management regimes. 1990. H.E. Theron

DAIRY CATTLE/MELKBEESTE

- *Physiology/Fisiologie*

- VS.3112/03/1/1: An investigation into in vitro culture techniques for hormone dependent mammary gland tissue in dairy cattle. 1983. J.P. van Zyl
- VS.3112/03/1/2: Milk prolactin surge before and during parturition and production parameters in dairy cattle. 1983. J.P. van Zyl
- VS.3112/03/1/3: Influence of lactation and exogenous peptide hormones on the physiology and metabolism of lipogenic precursors. 1985. S.I. van der Walt

- *Nutrition/Voeding*

- VS.3112/05/1/3: Ureum in complete diets for dairy cattle. 1982. L.J. Erasmus
- VS.3112/05/1/5: Dairy cattle nutrition: establishment of a degradability database. 1985. L.J. Erasmus
- VS.3112/05/1/7: Dairy cattle nutrition: strategic protein nutrition of high producing cows. 1985. B. Ferreira

- VS.3112/05/1/9: Dairy cattle: the in sacco digestibility of amino acid of UDP in the small intestine. 1987. L.J. Erasmus
- VS.3112/05/1/10: Dairy cattle: the effectiveness of yeast culture (YEA SACC) in a complete diet for dairy cattle. 1989. L.J. Erasmus
- VS.3112/05/1/11: Dairy cattle: the effect of a combination of an ionophore (monensin) and BST on the productivity of high producing cows. 1990. L.J. Erasmus

• *Upgrading/ Veredeling*

- VS.3112/07/1/3: Milkability and milk quality characteristics in the upgrading of dairy cattle. 1971. J.H. Hofmeyr

• *Management/ Bestuur*

- VS.3112/41/1/1: Biological economic data-analysing service for dairy cattle. 1981. B. Ferreira

MUTTON SHEEP/VLEISSKAPE

• *Nutrition/ Voeding*

- VS.3113/05/1/1: Mutton sheep: sorghum grain as the major feed component in combination with various problem sources in an intensive feedlot system. 1989. J.H.F. Meyer

• *Upgrading/ Veredeling*

- VS.3113/07/1/1: Upgrading of mutton sheep: quantification of genetic and non-genetic components of maternal effects. 1985. J.C. Greeff

WOOLLED SHEEP/WOLSKAPE

• *Reproduction/ Reproduksie*

- VS.3114/04/1/1: Woolled sheep: a comparative study of the reproduction characteristics of ewe lambs for four sheep breeds differing in fecundity. 1989. H.C. Bezuidenhout

• *Upgrading/ Veredeling*

- VS.3114/07/1/1: Skin and fibre characteristics in the upgrading of woolled sheep. 1972. O. Steinhagen
- VS.3114/07/2/1: Upgrading of reproduction characteristics of woolled sheep by means of cross-breeding. 1972. J.H. Hofmeyr
- VS.3114/07/2/2: Upgrading of woolled sheep crosses: evaluation of the Gotlander and its crosses for carpet wool production. 1985. J.C. Greeff
- VS.3114/07/2/3: Evaluation of selected cross-bred woolled sheep under normal farm conditions in co-operation with co-operative workers. 1985. J.C. Greeff

PELT SHEEP/PELSSKAPE

• *Reproduction/ Reproduksie*

- VS.3115/04/1/1: Reproduction aspects in pelt sheep: freezing of Karakul semen. 1971. J.P.C. Greyling

• *Upgrading/ Veredeling*

- VS.3115/07/1/1: Upgrading of pelt sheep - white Karakuls. 1980. J.H. Hofmeyr

MEAT GOATS/VLEISBOKKE

• *Reproduction/Reproduksie*

- VS.3117/04/1/1: Reproduction in the Boer goat: freezing of Boer goat semen. 1974. J.P.C. Greyling

PIGS/VARKE

• *Nutrition/Voeding*

- VS.3119/05/1/5: Pig nutrition: the "ideal protein" requirements of the growing pig. 1984. E.H. Kemm
- VS.3119/05/1/6: Pig nutrition: qualitative and quantitative aspects and implications of wheat as feed source. 1984. F.K. Siebrits
- VS.3119/05/1/7: Alternative feed sources for pigs - class FH sunflower seed. 1985. J. Viljoen
- VS.3119/05/1/12: Digestive physiology and metabolism aspects in animal feeding: lipid metabolism in the vicinity of the break-point in the growth curve of pigs. 1988. J.P. Minnaar
- VS.3119/05/1/13: Pig nutrition: the development of a computer-based pig herd simulation model. 1988. F.K. Siebrits
- VS.3119/05/1/14: Pig nutrition: use of Mobile Nylon Bag Technique (MNBT) on ileorectal anastomosis modified pigs to determine digestible protein and amino acid values at the terminal ileum. 1988. J. Viljoen
- VS.3119/05/1/15: Pig nutrition: the amino acid digestibility of different feedstuffs in the nutrition of the early weaned piglet. 1989. J. Viljoen
- VS.3119/05/1/16: Pig nutrition: determination of the bio-availability of different phosphorus sources. 1990. F.K. Siebrits

• *Upgrading/Veredeling*

- VS.3119/07/1/2: Upgrading of pigs: biochemical genetic typing for identification and parentage control. 1985. A. Swanepoel

CHICKENS/HOENDERS

• *Nutrition/Voeding*

- VS.31110/05/1/1: Nutrition of laying fowls - influence of calcium on phosphorus requirements. 1977. J.J. Prinsloo
- VS.31110/05/1/2: Nutrition of laying fowls - lysine requirements. 1976. F.D.C. Labuschagne
- VS.31110/05/1/3: Nutrition of laying fowls - seasonal energy and protein levels. 1975. F.D.C. Labuschagne
- VS.31110/05/1/5: The use of lupins as feed component in poultry diets. 1987. J.J. Prinsloo
- VS.31110/05/1/6: Evaluation of processing methods of full-fat soybeans in broiler diets. 1988. B.J. Welgemoed
- VS.31110/05/1/7: The use of a high protein sunflower oilcake meal as feed component in poultry diets. 1989. J.J. Prinsloo

• *Upgrading/Veredeling*

- VS.31110/07/1/1: Upgrading of laying fowls - sex-linked feather colour. 1972. J.J. Joubert
- VS.31110/07/1/2: Upgrading of laying fowls - red or gold feather colour. 1971. J.J. Joubert
- VS.31110/07/1/3: Upgrading of laying fowls - combining activity. 1971. J.J. Joubert
- VS.31110/07/1/4: Upgrading of laying fowls - Australorp. 1971. J.J. Joubert

- VS.31110/07/1/5: Upgrading of laying fowls - other breeds. 1972. J.J. Joubert
- VS.31110/07/1/6: Upgrading of laying fowl breeds - New Hampshire control flock. 1976. J.J. Joubert
- VS.31110/07/1/7: Genotype environment interaction in laying fowls - upgrading of laying fowl breeds. 1976. J.J. Joubert
- VS.31110/07/2/1: Upgrading of meat type male line fowls. 1975. J.J. Joubert
- VS.31110/07/2/2: Upgrading of meat type hen line fowls. 1962. J.J. Joubert
- VS.31110/07/2/3: Male and female line genetic control flocks. 1987. J.J. Joubert
- VS.31110/07/3/1: Broiler ascites: a study on the nutritional effect of ascorbic acid on the production and mortality of broilers. 1990. D.D. Malan

OTHER POULTRY/ANDER PLUIMVEE

• Nutrition/Voeding

- VS.31115/05/1/1: Nutrient requirement of other poultry - Chinese geese. 1965. J.J. Prinsloo
- VS.31115/05/1/2: Nutrient requirement of other poultry feeding systems - ducks. 1977. M.D. Olver

• Upgrading/Veredeling

- VS.31115/07/1/1: Upgrading of other poultry - Hagedoorn system with ducks. 1965. M.D. Olver

Animal products/Diereprodukke

MEAT/VLEIS

• Norm studies/Normstudies

- VS.3121/50/1/2: Meat production: carcass evaluation - cattle. 1975. J.F. de Bruyn
- VS.3121/50/1/3: Meat production: chilling of beef carcasses. 1976. P.H. Heinze
- VS.3121/50/1/8: Meat production: carcass grading system - small stock. 1981. G.G. Bruwer
- VS.3121/50/1/9: Meat production: compensatory growth - cattle. 1982. J.F. de Bruyn
- VS.3121/50/1/11: Meat production: porcine stress syndromes. 1984. P.H. Heinze
- VS.3121/50/1/15: The influence of chilling and other environmental factors on the shelf-life of meat. 1987. G.L. Nortje
- VS.3121/50/1/16: A comparison between the agar impression technique, the modified agar impression technique and the excision technique to determine the bacterial contamination of meat. 1987. S.J. Botha
- VS.3121/50/1/18: Nutritional and quality characteristics of beef. 1988. H.C. Schönfeldt
- VS.3121/50/1/19: Survey of the meat product industry of the Republic of South Africa. 1988. I.B. Zondach
- VS.3121/50/1/20: The influence of specific growth promoters on the characteristics of wool, skin and leather and the relationships between skin and leather characteristics of South African Mutton Merino sheep. 1988. A. Liebenberg
- VS.3121/50/1/21: Meat production: nutritional and quality characteristics of veal. 1989. H.C. Schönfeldt
- VS.3121/50/1/22: Meat production: evaluation of quality characteristics of the *Mm longissimus thoracis et lumborum* obtained from lambs fed on cotton seed or cake with a supplementary diet of either protected fats or grain sorghum. 1989. I.B. Zondach
- VS.3121/50/2/1: Pork production and meat norm studies: a survey of the carcass characteristics of pig carcasses in the R.S.A. 1987. G.G. Bruwer

- VS.3121/50/2/2: Pork and pork production norm studies: the effects of castration and feeding unsaturated oil (sunflower seed) on the fatty acid composition of pig fat (intra- and extra-muscular). 1987. S.M. de Jong
- VS.3121/50/2/3: Pork production and meat norm studies: carcass evaluation of cross-bred pigs. 1987. G.G. Bruwer
- VS.3121/50/2/4: Meat quality characteristics of cross-bred pigs. 1987. P.H. Heinze
- VS.3121/50/2/5: The development of a classification and grading system for pig meat in South Africa. 1987. G.G. Bruwer
- VS.3121/50/2/6: Meat quality characteristics as influenced by genotype, slaughter mass and sex type. 1987. P.H. Heinze
- VS.3121/50/2/7: Pork fat quality characteristics as influenced by genotype, slaughter mass and sex type. 1987. S.M. de Jong
- VS.3121/50/2/8: The suitability of carcass meats for processing as influenced by genotype, sex type and slaughter mass. 1987. J.C. Venter
- VS.3121/50/2/9: Pork production norm studies: evaluation of sensory characteristics of roasts and processed products as influenced by genotype, sex type and slaughter mass. 1987. I.B. Zondach
- VS.3121/50/3/1: Microbiological and technological properties of fresh pork during slaughtering, deboning, vacuum and gas packaging and distribution. 1987. E.M. Scholtz
- VS.3121/50/3/2: Evaluation of different packaging systems and their suitability for application in centralised pre-packing of pig meat retail cuts. 1990. E.M. Scholtz
- VS.3121/50/4/1: The influence of zinc tannate on sexual development, production and product characteristics of the meat bulls. 1987. P.E. Strydom
- VS.3121/50/4/2: Growth manipulation and meat norm studies: the influence of different anabolic growth promoters under intensive conditions on the performance and product characteristics of lambs. 1989. P.E. Strydom

MEAT PRODUCTS/VLEISPRODUKTE

- *Norm studies/Normstudies*

- VS.3122/50/5/1: The occurrence of *Listeria*, *Salmonella* and *Campylobacter* in meat and meat products seed or cake with supplementary

- *Technology/Tegnologie*

- VS.3122/52/1/1: The optimal utilisation of carcasses and meat condemned on the grounds of being sub-standard, but safe in processed meat products for human consumption. 1990. T. Pietersen

MILK/MELK

- *Microbiology/Mikrobiologie*

- VS.3123/08/1/5: Milk: preservation of milk samples for bacterial count tests. 1983. H. Gavron
- VS.3123/08/2/4: The presence and influence of facultative anaerobic fecal bacteria in milk and milk products. 1987. D. Wessels
- VS.3123/08/2/5: Milk: the occurrence and importance of biofilms in milk pipelines in the dairy industry. 1988. C. Koutzayiotis
- VS.3123/08/3/2: The shelf-life of aseptical-packaged pasteurised milk. 1983. J.F. Mostert
- VS.3123/08/3/4: Presence, isolation and identification of psychrotrophic bacteria in raw milk samples. 1987. G.J. Swart
- VS.3123/08/4/2: Milk: assay of antibiotics. 1983. H. Gavron

- *Norm studies/Normstudies*

VS.3123/50/1/1: Somatic cell counts in herd milk. 1988. G.J. Swart

- *Technology/Tegnologie*

VS.3123/52/2/1: Technological control of the metabolic activity of psychrotrophic bacteria. 1987. G.J. Swart

- *Chemistry/Chemie*

VS.3123/53/1/4: The non-protein nitrogen content of milk in the RSA. 1988. N.H. Robertson

VS.3123/53/1/5: The relationship between milk protein polymorphism and the production of milk and milk proteins. 1988. D.J. de Lange

VS.3123/53/2/1: Discolourisation of UHT-milk. 1981. B.G. Venter

VS.3123/53/4/1: Natural and added iodine in milk. 1981. D. Wessels

VS.3123/53/4/2: Regional and seasonal tendencies and sources of contamination of pesticides in milk products. 1985. L.E. Smit

DAIRY PRODUCTS/SUIWELPRODUKTE

- *Microbiology/Mikrobiologie*

VS.3124/08/1/1: Dairy products: a genetic study of the group *N. streptococci*. 1981. H. Gavron

VS.3124/08/1/3: Dairy products: bacterial content of air in dairy factories. 1983. K. Radmore

VS.3124/08/1/5: The long chain fatty acid composition as an aid in the identification of the lactic acid streptococci used in commercial starter cultures in South Africa. 1988. H.B. Muller

VS.3124/08/1/8: The bacteriological composition of commercial cheese starters used in South Africa. 1987. F.S. Botha

VS.3124/08/2/2: Dairy products: the influence of non-starter organisms on Cheddar cheese. 1983. A.J. Kruger

VS.3124/08/2/4: Dairy products: the incidence and practical importance of psychrotrophic Enterobacteriaceae in milk and dairy products. 1987. A.L. Malan

VS.3124/08/3/5: Dairy products: the evaluation of pathogenic bacteria in milk and cheese. 1983. H. Gavron

VS.3124/08/3/6: Dairy products: screening of South African raw milk for the presence of *Listeria monocytogenes*. 1988. T. Wnorowski

- *Norm studies/Normstudies*

VS.3124/50/1/1: Dairy products: production and quality of butter in South Africa. 1981. J.J. du Toit

- *Technology/Tegnologie*

VS.3124/52/1/1: Dairy products: technique studies in the concentration of whey and skim milk by ultrafiltration. 1983. T.E.H. Downes

VS.3124/52/1/2: The use of products recovered by ultrafiltration in dairy products. 1972. T.E.H. Downes

VS.3124/52/1/5: Dairy products: the development of a low-energy dairy spread with favourable spreadability. 1982. T.E.H. Downes

VS.3124/52/1/6: Dairy products: demineralisation, processing and utilisation of cheese whey. 1982. A.P. Potgieter

- VS.3124 52.1/10: Hydrolysis of lactose in cheese whey for use in dairy products or other foods. 1984. T.E.H. Downes
- VS.3124 52/1/11: Dairy products: the manufacture of cold water instant full-cream milk powder on a two-stage spray dryer. 1985. T.E.H. Downes

• *Chemistry/Chemie*

- VS.3124/53/3/4: Dairy products: the identification of milk proteins in other foods. 1983. B.G. Venter
- VS.3124/53/3/6: Levels of linoleic acid (trans) in dairy products and oils before and after processing. 1984. L.D. Nourse
- VS.3124, 53/3, 7: Dairy products versus processed oils as fat-energy source: the disturbance of the metabolism of all cis-linoleic acid by the transforms as measured by growth of broiler chicks. 1984. L.D. Nourse
- VS.3124/53/3/8: Dairy products versus processed oils as fat-energy source: the disturbance of the metabolism of all cis-linoleic acid by the transforms as measured by uncontrolled cell proliferation in tissue cultures. 1984. L.D. Nourse
- VS.3124/53/3/9: The incidence of heavy metals in dairy products. 1985. D.J.W. Bester
- VS. 3124/53/3/10: The role that intake of fermented dairy products can play in the recovery of disorders in carbohydrate and lipid metabolism as induced by diet. 1990. D.J. de Lange

Supporting animal research/Ondersteunende veekundige navorsing

ANIMALS/DIERE

• *Reproduction/Reproduksie*

- VS.3133/04/1/2: Animal reproduction: an in vitro rat embryo culture bio-assay to detect exogenous teratogens (lead and copper). 1985. J.M. Burgman
- VS.3133/04/1/3: Animal production: comparative study of the pellet and straw freezing methods of sheep semen by means of the zona-free hamster ovum sperm penetration assay. 1989. H. Hattingh

• *Nutrition/Voeding*

- VS.3133/05/1/9: Feed intake in the nutrition of farm animals - growth studies with beef steers under production conditions. 1984. J.P. Campher
- VS.3133/05/1/10: Feed intake in the feeding of farm animals: quantification of digestive energy losses on different ruminant diets. 1984. N. Slabbert
- VS.3133/05/1/12: Feed intake in the nutrition of farm animals: predicting the voluntary feed intake of South African roughages for growing sheep and cattle. 1988. J.P. Pienaar
- VS.3133/05/2/8: Protein nutrition: factors influencing the efficiency of microbial protein synthesis in the rumen. 1988. A. Kistner
- VS.3133/05/2/9: Protein nutrition: *Geotrichum candidum* as single cell protein for monogastric animals. 1988. F.J. Nell
- VS.3133/05/3/4: Digestive physiology and metabolism aspects in the feeding of farm animals - glucose production. 1975. J.G. van der Walt
- VS.3133/05/3/12: Digestive physiology and metabolism aspects in the feeding of farm animals - bacterial growth, Na⁺ and K⁺. 1980. R.I. Mackie
- VS.3133/05/3/14: Digestive physiology and metabolism aspects in animal feeding - growth constants, cellulolytic bacteria. 1973. R.I. Mackie
- VS.3133/05/3/18: Digestive physiology and metabolism aspects in the feeding of farm animals: regulation and control of proteases in pure cultures of rumen bacteria. 1984. E. Strydom

- VS.3133/05/3/19: Animals: influence of lactation and nutrition on the metabolism of lipogenic precursors. 1985. J.G. van der Walt
- VS.3133/05/3/20: Digestive physiology and metabolism aspects in animal feeding: partitioning of ruminal acetate and propionate between lipogenesis and gluconeogenesis, respectively in sheep. 1986. M.J. Linington
- VS.3133/05/3/21: Digestive physiology and metabolism aspects in animal feeding - peptide transport and utilisation by rumen bacteria. 1986. K. Westlake
- VS.3133/05/3/23: Digestive physiology and metabolism aspects in animal feeding - development of an in vitro method for evaluating protein digestibility. 1987. P.H. Henning
- VS.3133/05/3/24: Digestive physiology and metabolism aspects in animal feeding: ruminal microbial yield during in vitro incubation of grain mixtures. 1987. P.H. Henning
- VS.3133/05/3/25: Digestive physiology and metabolism aspects in animal feeding: evaluation of acetate clearance rate as an index of growth rate and lipogenesis in lambs fed roughage-based diets. 1987. P.B. Cronje
- VS.3133/05/3/27: Digestive physiology and metabolism aspects in animal feeding - the relationship between rumen microbial growth efficiency and energy supply pattern in vitro. 1988. P.H. Henning
- VS.3133/05/3/28: Digestive physiology and metabolism aspects in animal feeding - evaluation of protected fats for inclusion in ruminant diets. 1988. P.B. Cronje
- VS.3133/05/3/30: Digestive physiology and metabolism aspects in the feeding of farm animals: changes in blood composition associated with the stress of fasting in cattle. 1989. J.P.C. Greyling
- VS.3133/05/3/31: Digestive physiology and metabolism aspects in the nutrition of farm animals; role of synergistic relationships between rumen bacterial species in the degradation of plant cell walls. 1990. A Kistner
- VS.3133/05/3/32: Digestive physiology and metabolism aspects in animal feeding: the influence of rate and synchronisation of nitrogen and energy supply on rumen parameters and microbial growth efficiency. 1990. P.H. Henning
- VS.3133/05/4/4: Crop residues of by-products for animal nutrition - pigs and poultry. 1982. J. Viljoen
- VS.3133/05/4/7: Evaluation and upgrading of crop residues and fibrous industrial waste and by-products as feed source for ruminants. 1988. R. Meeske
- VS.3133/05/6/5: Dietary components in feeds for animal feeding: whole maize grain. 1984. J.P. Campher
- VS.3133/05/6/6: Dietary components in feeds for animal feeding: combinations of energy sources. 1985. P.H. Henning
- VS.3133/05/6/7: Dietary components in feeds for animal feeding: water-reconstituted grain sorghum in fattening diets for beef steers. 1985. N. Slabbert
- VS.3133/05/6/8: Dietary components in feeds for animal feeding: the influence of grain softness on the utilisation of whole maize by beef steers. 1985. N. Slabbert
- VS.3133/05/6/9: Dietary components in feeds for animal feeding: ammoniated grain sorghum in fattening diets for beef steers. 1987. N. Slabbert
- VS.3133/05/6/10: Dietary components in feeds for animal feeding: the utilisation of whole grain from different maize cultivars in fattening diets of beef steers. 1988. N. Slabbert

• *Genetics/Genetika*

- VS.3133/06/1/4: Genetic aspects of blood typing in farm animals. 1969. S.J. du Plessis.
- VS.3133/06/1/5: Genetic production models for farm animals - milk production. 1977. C.Z. Roux
- VS.3133/06/1/6: Laboratory animals in genetic studies: efficiency of feed utilisation. 1978. M.M. Scholtz
- VS.3133/06/1/9: Genetic aspects of karyotyping in farm animals. 1978. N.D. Nel
- VS.3133/06/1/10: Laboratory animals in genetic studies: milk production estimation techniques - rats. 1982. M.M. Scholtz

- VS.3133/06/1/11: The genetic maintenance of small animal populations and the effect of in-breeding on production characteristics. 1982. J.C. Greeff
- VS.3133/06/1/12: Genetic studies on farm animals: preparation of monospecific anti-sera against lymphocyte antigens for investigation into the immune system of cattle. 1985. J. Bester

• *Upgrading/Veredeling*

- VS.3133/07/1/1: Upgrading studies on indigenous animals - maintenance, evaluation and improvement of indigenous Sanga cattle. 1982. M.M. Scholtz
- VS.3133/07/1/2: Upgrading studies on indigenous animals - cytogenetic studies on Nguni cattle. 1982. N.D. Nel
- VS.3133/07/1/3: Upgrading of animals: the evaluation of highly fertile sheep - breeds and strains in crosses. 1982. J.C. Greeff
- VS.3133/07/1/5: Animals: genetic aspects of protein and enzyme polymorphism in sheep and goats. 1985. M.C. Reid
- VS.3133/07/1/6: Upgrading of animals: production models and statistical methods for the breeding of farm animals. 1986. C.Z. Roux
- VS.3133/07/2/1: Biotechnical research for the upgrading of farm animals: the production of monozygotic twins using embryo splitting. 1986. N.D. Nel

Biotechnology/Animal science/Biotegnologie/Veekunde

BIOTECHNOLOGY/BIOTEGNOLOGIE

• *Upgrading/Veredeling*

- VS.3141/07/1/1: Biotechnological research for the upgrading of farm animals: the production of monozygotic twins using embryo splitting. 1986. N.D. Nel
- VS.3141/07/1/2: Biotechnological research for the upgrading of farm animals: genome mapping by restriction fragment length polymorphisms in livestock. 1987. N.D. Nel
- VS.3141/07/1/3: Biotechnological research for the upgrading of farm animals' DNA pattern (fingerprinting) as an aid in parentage studies. 1990. E.J. Harris

VETERINARY RESEARCH/VEEARTSENYKUNDIGE NAVORSING

Pathological investigations/Patologiese ondersoeke

PATHOLOGICAL INVESTIGATIONS/PATOLOGIESE ONDERSOEKE

• *Pathology/Patologie*

- OP.3211/19/1/1: Diagnostic pathological investigations into mortalities of animals through macro- and microscopical techniques. 1981. J.A.W. Coetzer
- OP.3211/19/1/2: Diagnostic investigations into mortalities through electron microscopical techniques. 1981. L. Prozesky
- OP.3211/19/2/8: Pathological investigations: toxicology, clinical pathology and pathology of *Cestrum laevigatum* poisoning in sheep and cattle. 1985. J.J. van der Lugt
- OP.3211/19/2/9: The documentation of the toxicological chemical, chemical-pathological and pathological aspects of *Crotalaria sparioides* poisoning in rabbits and cattle. 1986. J.J. van der Lugt
- OP.3211/19/2/10: Pathological investigations: electron microscopic studies of platelets from lambs infected with Rift Valley fever virus and Wesselsbron disease virus. 1986. J.A.W. Coetzer

- OP.3211/19/2/11: Toxicological, pathophysiological and pathological aspects of *Galenia africana* poisoning in sheep. 1986. J.J. van der Lugt
- OP.3211/19/2/12: Pathological investigations: the cytology and treatment of keratoconjunctivitis in sheep. 1990. J. Vorster

Food hygiene/Voedselhygiëne

ANIMAL FOODS/DIERLIKE VOEDSELS

• Pathology/Patologie

- OP.3221/19/1/1: Animal foods: diagnosis of mastitis as a herd problem. 1981. W.H. Giesecke
- OP.3221/19/1/2: Animal foods: microscopical investigation of the teat tip and canal at different stages of udder development. 1982. I.M. Clayden
- OP.3221/19/1/3: Animal foods: lacteal levels of glucose and frequencies of subclinical mastitis and other udder conditions. 1981. W.H. Giesecke
- OP.3221/19/1/5: Animal foods: the effect of teat dipping on subclinical udder conditions in dairy cows milked by a machine. 1982. W.H. Giesecke
- OP.3221/19/1/7: Animal foods: normal bacterial flora on bovine udders as affected by age, breed and season. 1979. Anette M. Durand
- OP.3221/19/1/9: Animal foods: interlaboratory standardisation of somatic cell counts in cows' milk in the RSA. 1983. W.H. Giesecke
- OP.3221/19/1/10: Animal foods: the development of the methodology for an investigation of primary prostaglandins and thromboxanes in the normal and pathological udder secretion. 1985. Z.E. Kowalski
- OP.3221/19/1/11: Animal foods: a methodological investigation of the lipoxygenase products of arachidonic acid in normal and pathological udder secretions and tissue homogenates. 1985. Z.E. Kowalski
- OP.3221/19/1/12: Animal foods: determination of ketones in bovine milk by headspace gaschromatography. 1989. H. Winterbach
- OP.3221/19/1/13: The role and significance of catecholamines in bovine udder health. 1989. J.H. du Preez
- OP.3221/19/1/14: The role and significance of reducing sugars relative to catecholamines in blood and milk of dairy cattle. 1989. J.H. du Preez
- OP.3221/19/3/1: Animal foods: potentially pathogenic micro-elements in animal feeds. 1981. Anette M. Durand
- OP.3221/19/3/4: The use of bacterial adenosinetriphosphate (ATP) analysis for the determination of the bacteriological quality of animal feeds. 1985. S.M. Payze

• Technology/Tegnologie

- OP.3221/52/2/1: Animal foods: differentiation of the species origin of different meat types. 1983. W.H. Giesecke

Toxicological investigations/Toksikologiese ondersoeke

TOXIC SUBSTANCES/TOKSIESE STOWWE

• Toxicology/Toksikologie

- OP.3231/18/1/1: Diagnostics of poisoning of animals by toxic substances. 1981. T.S. Kellerman

- OP.3231/18/2/1: The role of fungi, plants and toxic substances in the aetiology and pathogenesis of photosensitivity. 1971. T.S. Kellerman
- OP.3231/18/2/4: Evaluation of the efficacy of medical and industrial activated charcoals in the prophylaxis and treatment of plant poisonings and mycotoxicoses. 1984. T.S. Kellerman
- OP.3231/18/2/5: Salinomycin poisoning in horses. 1985. P.W. Nel
- OP.3231/18/2/6: Toxic substances: pathogenesis and early diagnosis of gousiekte. 1987. N. Fourie
- OP.3231/18/2/7: Neonatal effects of diploidosis on livestock. 1988. T.S. Kellerman
- OP.3231/18/2/8: Toxic substances: an investigation into the use of pyrodoxine and its metabolites for the treatment of *Albizia* toxicoses. 1989. B. Gummow

Internal parasite investigations/Interne-parasietondersoek

HELMINTHS/HELMINTE

• Taxonomy/Taksonomie

- OP.3241/01/1/1: Identification of helminths and investigation of definite host ranges. 1983. E.L. Visser
- OP.3241/01/1/2: The taxonomy and incidence of helminths of the Cape hyrax (*Procavia capensis*). 1983. E.L. Visser

• Pests/Plae

- OP.3241/20/1/1: Helminths: diagnosis of unknown internal parasite phenomena. 1981. J.A. van Wyk
- OP.3241/20/2/1: Helminths: immunology and serology of cysticercosis of cattle and pigs. 1970. E.L. Visser
- OP.3241/20/2/5: Helminths: epidemiology of tapeworms of ruminants. 1982. E.L. Visser
- OP.3241/20/2/6: Helminths: incidence and treatment of *Stilesia globipunctata* infestation in South Africa. 1983. E.L. Visser
- OP.3241/20/3/1: Helminths: reinfestation of cattle with bilharzia. 1969. J.A. van Wyk
- OP.3241/20/3/2: Helminths: influence of temperature on the development of the larval stages of *Fasciola* spp. 1979. R.M.R. Alves
- OP.3241/20/3/3: Helminths: development of *Fasciola* spp. of cattle and sheep in various definitive hosts. 1978. R.M.R. Alves
- OP.3241/20/3/4: Helminths: pathological physiology of *Schistosoma matthei* infestation of sheep and cattle. 1969. J.A. van Wyk
- OP.3241/20/3/5: Helminths: epidemiology of paramphistomiasis. 1981. J.A. van Wyk

• Chemical control/Chemiese beheer

- OP.3241/21/1/1: Chemical control of helminths with special reference to resistance. 1982. J.A. van Wyk

• Technology/Tegnologie

- OP.3241/52/1/1: Helminths: long-term storage of pure strains of helminths. 1973. J.A. van Wyk
- OP.3241/52/1/2: Recovery of helminths and/or their ova from animals. 1976. J.A. van Wyk
- OP.3241/52/1/3: Helminths: *ante-mortem* determination of worm loads in animals. 1985. J.A. van Wyk
- OP.3241/52/1/4: Helminths: an investigation of various egg counting methods and the development of quicker *post-mortem* techniques for the determination of internal parasite loads. 1987. F.J. de Villiers

Reproduction investigations/Reproduksie-ondersoeke

INFERTILITY/ONVRUGBAARHEID

• Pathology/Patologie

- OP.3251/19/1/1: Diagnostics of infertility an abortion in animals. 1973. B. Gummow
OP.3251/19/1/2: Serodiagnostics of infertility, abortion and other diseases. 1981. C.C. Williamson
OP.3251/19/2/2: Infertility: immunity to trichomoniasis in cattle. 1981. S. Herr
OP.3251/19/2/3: Infertility: ulcerative dermatosis in sheep. 1981. C.J.V. Trichard
OP.3251/19/2/5: Infertility: bacterial infections of the genitalia of sheep. 1981. B.C. Jansen

Entomological investigations/Entomologiese ondersoeke

EXTERNAL PARASITES/EKSTERNE PARASIEDE

• Entomology/Entomologie

- OP.3261/14/1/1: External parasites: identification and systematics of insects of veterinary importance. 1981. E.M. Nevill

• Acarology/Akarologie

- OP.3261/15/1/1: External parasites: identification and systematics of ticks and mites of veterinary importance. 1981. J.B. Walker
OP.3261/15/1/2: External parasites: systematics of the genus *Rhipicephalus*. 1973. J.B. Walker
OP.3261/15/1/3: External parasites: identification and systematics of mites of veterinary importance. 1986. L.C. Jordaan

• Pathology/Patologie

- OP.3261/19/1/1: External parasites: *Cowdria ruminantium* in *Amblyomma hebraeum*. 1977. J.D. Bezuidenhout
OP.3261/19/1/2: External parasites: multiplication of arboviruses in *Culicoides* spp. 1973. E.M. Nevill
OP.3261/19/1/3: External parasites: aetiology of sweating sickness. 1971. P.T. Oberem
OP.3261/19/1/4: External parasites: the congenital resistance of new-born calves against heartwater. 1987. J.L. du Plessis
OP.3261/19/1/8: External parasites: a biochemical study of the tissues of *Rhipicephalus evertsi*, *Hyalomma* spp., *Exodes rubicundus*, *Boophilus* spp. and *Ornithodoros savignyei* with special reference to their toxins. 1984. J.D. Bezuidenhout
OP.3261/19/1/9: External parasites: determination of the tick load that will ensure enzootic stability with regard to heartwater. 1984. J.L. du Plessis
OP.3261/19/1/10: External parasites: the epidemiology of Karoo paralysis. 1985. J.D. Bezuidenhout
OP.3261/19/1/11: External parasites: the in vitro cultivation of *Cowdria ruminantium*. 1985. J.D. Bezuidenhout
OP.3261/19/1/12: External parasites: the role of complement, conglutinin and immune-conglutinin in the pathogenesis of heartwater. 1985. J.L. du Plessis
OP.3261/19/1/13: External parasites: the use of the Welgevonden strain of *Cowdria ruminantium* for heartwater research. 1986. J.L. du Plessis
OP.3261/19/1/14: External parasites: the congenital resistance of new-born calves against heartwater. 1987. J.L. du Plessis

• *Pests/Plae*

- OP.3261/20/1/3: External parasites: biology and control of *Simulium* spp. in South Africa. 1968. L.C. Jordaan
- OP.3261/20/1/5: External parasites: tick resistance in indigenous and European cattle breeds. 1982. A.M. Spickett
- OP.3261/20/1/6: External parasites: the effects of host immunity of Brahman and Hereford cattle breeds on the dynamics of tick populations in a mixed sourveld environment. 1984. A.M. Spickett
- OP.3261/20/1/7: External parasites: hosts of *Amblyomma hebraeum* and their importance in the epidemiology of heartwater. 1985. J.D. Bezuidenhout

Virus investigations/Virusondersoeke

VIRUSES/VIRUSSE

• *Pathology/Patologie*

- OP.3271/19/1/1: Diagnostics of virus diseases of animals. 1981. B.J.H. Barnard
- OP.3271/19/2/3: Growth attenuation of African horse sickness viruses in tissue culture. 1968. B.J. Erasmus
- OP.3271/19/2/5: Modification of bluetongue virus in tissue culture. 1970. B.J. Erasmus
- OP.3271/19/2/6: Characterisation of newer orbiviruses. 1973. B.J. Erasmus
- OP.3271/19/2/7: Flavivirus infection of sheep and cattle. 1981. B.J.H. Barnard
- OP.3271/19/2/8: Survey of bluetongue and other viruses in *Culicoides* spp. 1979. B.J. Erasmus
- OP.3271/19/2/9: Viruses: the epidemiology of bovine malignant catarrh. 1983. B.J.H. Barnard
- OP.3271/19/2/10: Viruses: pathogenicity and tick transmission of Crimean Congo haemorrhagic fever in cattle and sheep. 1984. B.J. Erasmus
- OP.3271/19/2/11: Viruses: the development and evaluation of a vaccine against bovine malignant catarrh. 1989. B.J. Barnard
- OP.3271/19/2/12: Viruses: the detection of MCF-virus DNA in bovines and insects by nucleic acid hybridization. 1989. A.L. Michel

Highly contagious diseases/Hoogsaansteeklike siektes

HIGHLY CONTAGIOUS VIRUSES/HOOGSAANSTEEKLIKE VIRUSSE

• *Pathology/Patologie*

- OP.3281/19/1/1: Diagnostics of highly contagious virus diseases of animals. 1980. G.R. Thomson
- OP.3281/19/1/2: Highly contagious viruses: the development of ELISA techniques for the detection of foot-and-mouth disease (FMD) and swine vesicular disease (VSD) viruses and antibodies directed against them. 1985. J.J. Esterhuyzen
- OP.3281/19/2/1: Highly contagious viruses: epidemiology of African swine fever in free-living hosts. 1978. G.R. Thomson
- OP.3281/19/2/3: Highly contagious viruses: the role of wild cloven-hoofed animals in the epidemiology of foot-and-mouth disease. 1981. G.R. Thomson
- OP.3281/19/2/4: Highly contagious viruses: assessment of foot-and-mouth disease vaccines. 1983. C.D. Meredith
- OP.3281/19/2/5: Highly contagious viruses: investigation of the excretion of SAT types of foot-and-mouth disease (FMD) virus from experimentally infected cattle. 1984. M.D. Gainaru

OP.3281/19/2/6: Gamma irradiation for the inactivation of highly contagious viruses in animal products. 1986. G.R. Thomson

Poultry and fish diseases/Pluimvee- en vissiekt

POULTRY/PLUIMVEE

• *Pathology/Patologie*

OP.3291/19/1/1: Diagnostics of disease conditions of poultry. 1981. F.W. Huchzermeyer
OP.3291/19/2/2: Altitude disease ascites of broilers. 1985. F.W. Huchzermeyer
OP.3291/19/2/3: Turkey malaria. 1985. F.W. Huchzermeyer
OP.3291/19/2/4: Studies on the pathogenicity of rough and non-typable strains of *Escherichia coli* isolated from poultry. 1987. M.A. Kloryga
OP.3291/19/2/5: A Survey of the susceptibility of smooth *E. coli* in commercial poultry flocks to commonly used anti-microbials. 1988. J.A. Cilliers

FISH/VIS

• *Pathology/Patologie*

OP.3292/19/1/1: Diagnostics of disease conditions of fish. 1981. R.R. Bragg
OP.3292/19/1/2: Trout virus survey. 1988. R.R. Bragg

Bacterial investigations/Bakteriese ondersoeke

BACTERIA/BAKTERIEë

• *Pathology/Patologie*

OP.32101/19/1/1: Diagnostics of bacterial diseases of animals. 1981. Marijke M. Henton
OP.32101/19/2/4: Bacteria: improvement of *E. coli* vaccines. 1982. P. Oberem
OP.32101/19/2/8: A study of the occurrence of plasmids and lysogenic phages and its correlation with toxin production in *Clostridium perfringens* type D. 1986. G. Groenewald
OP.32101/19/2/9: The development of a smooth avirulent *Salmonella typhimurium* vaccine. 1988. M.L. van der Walt
OP.32101/19/2/10: Bacteria: epidemiological survey of *Pseudomonas aeruginosa* strains in South Africa. 1990. S.C. de Wet
OP.32101/19/2/11: Bacteria: investigation into in vitro methods for the typing of *Clostridium perfringens*. 1990. S.C. de Wet

Protozoal investigations/Protosoa-ondersoeke

PROTOZOA/PROTOSOA

• *Pathology/Patologie*

OP.32111/19/1/1: Diagnostics of protozoal and rickettsial diseases of animals. 1981. D.T. de Waal
OP.32111/19/2/1: Protozoa: quality, safety and efficacy of Onderstepoort vaccines against bovine babesiosis. 1981. D.T. de Waal
OP.32111/19/2/2: Protozoa: epidemiology of *Besnoitia besnoitii* infection in cattle. 1981. D.T. de Waal

- OP.32111/19/2/3: Protozoa: identity, distribution and transmission of *Theileria* spp. in South Africa. 1977. W.H. Stoltz
- OP.32111/19/2/6: Protozoa: in vitro cultivation of *Babesia* spp. with special reference to *Babesia bovis*. 1984. F.T. Potgieter
- OP.32111/19/2/7: Protozoa: a study of babesiosis in horses. 1984. D.T. de Waal
- OP.32111/19/3/1: Protozoa: the quality, safety and efficacy of Onderstepoort anaplasmosis vaccines. 1981. F.T. Potgieter
- OP.32111/19/3/2: Protozoa: transmission of *Anaplasma marginale* by ticks and biting insects. 1977. F.T. Potgieter
- OP.32111/19/3/3: The treatment of heartwater. 1988. P.T. Oberem
- OP.32111/19/3/4: Immunisation against heartwater by means of chemoprophylaxis. 1989. J.A. Olivier
- OP.32111/19/3/5: Immunisation against heartwater with a combination of *Cowdria ruminantium* stocks. 1989. J.L. du Plessis
- OP.32111/19/3/6: The influence of passage through the bont tick *Amblyomma hebraeum* on the pathogenicity of *Ehrlichia*. 1990. J.L. du Plessis
- OP.32111/19/3/7: The identification isolation and characterisation of the antigenic proteins of *Cowdria ruminantium*. 1990. M. Rossouw

Molecular biological investigations/Molekulêre biologiese ondersoeke

MACROMOLECULES/MAKROMOLEKULE

• Virology/Virologie

- OP.32121/12/1/4: Macromolecules: cloning of jaagsiekte virus through genetic manipulation. 1982. E.S. Posnett
- OP.32121/12/1/6: Production of monoclonal antibodies against jaagsiekte retrovirus antigens. 1985. D.F. York
- OP.32121/12/1/7: Macromolecules: the distribution and role of lentiviruses in sheep in South Africa. 1986. D.W. Verwoerd

• Protozoology/Protoosoölogie

- OP.32121/13/1/1: Macromolecules: the construction and partial characterisation of genomic libraries of *Babesia* and *Anaplasma* DNA. 1985. R.E. Ambrosio
- OP.32121/13/1/3: Macromolecules: the development of probes for the detection of *Anaplasma* in bovine blood. 1987. E.S. Visser
- OP.32121/13/1/4: Macromolecules: the isolation and characterisation of the probes for the identification of *Babesia equi* and *Babesia caballi* in horses. 1987. E.S. Posnett
- OP.32121/13/1/5: Macromolecules: the isolation and characterisation of *Cowdria ruminantium* nucleic acid probes. 1988. S.C. Wilkens
- OP.32121/13/1/6: Macromolecules: nucleic acid probes for the differentiation of bovine *Babesia* species. 1990. R.E. Ambrosio
- OP.32121/13/1/7: Macromolecules: a comparison of antigenic proteins in different *Anaplasma marginale* isolates. 1990. J. Fehrsen

Biochemical investigations/Biochemiese ondersoeke

BIOCHEMICAL INVESTIGATIONS/BIOCHEMIESE ONDERSOEKE

• Virology/Virologie

- OP.32131/12/1/7: The use of vaccinia virus expression vector for the neutralising antigen, protein P2 of bluetongue virus. 1987. Alberdina A. van Dijk

- OP.32131/12/1/8: Biochemical investigations: an investigation of the composition and function of the virus specific tubules which are found in orbivirus infected cells. 1987. Alberdina A. van Dijk
- OP.32131/12/1/9: Biochemical characterisation of equine encephalosis virus and the development of diagnostic genomic probes for the virus. 1987. G.J. Viljoen
- OP.32131/12/1/10: The development and use of cloned genome segments as probes for the identification of horsesickness virus. 1987. C.W. Vroon
- OP.32131/12/1/11: Preparation and characterisation of monoclonal antibodies to African horsesickness virus. 1987. W. van Wyngaardt
- OP.32131/12/1/12: Biochemical investigation of the structure and function of a phosphorylated non-structural protein of bluetongue virus. 1986. S.J. Hall
- OP.32131/12/1/13: An investigation of the composition and genetic variation of the group-specific antigen of bluetongue virus. 1987. M. Cloete
- OP.32131/12/1/14: Identification of the nucleotide sequence coding for the neutralisation specific epitope or epitopes of bluetongue virus. 1987. N.T. van der Walt
- OP.32131/12/1/15: Investigation of pox virus as potential vectors for recombinant vaccines. 1989. Alberdina A. van Dijk

Chemical pathology and poison chemistry/Chemiese patologie en gifstofchemie

POISONS/GIFSTOWWE

• Toxicology/Toksikologie

- OP.32141/18/1/1: Poisons of and poisoning by cardiac glycosides from plants of the family Crassulaceae. 1981. L.A.P. Anderson
- OP.32141/18/1/2: Poisons of and poisoning caused by *Cynanchum* species. 1981. G.L. Erasmus
- OP.32141/18/1/3: Poisons of and poisoning caused by *Sarcostemma viminalis*. 1984. L.A.P. Anderson
- OP.32141/18/1/4: Poisons of and poisoning caused by *Ornithogalum thyrsoides*. 1983. J. de V. du Toit
- OP.32141/18/1/5: An investigation of *Albizia tanganyicensis* poisoning. 1986. L.A.P. Anderson
- OP.32141/18/1/6: An investigation of *Lasiospermum bipinnatum* poisoning. 1986. L.A.P. Anderson
- OP.32141/18/2/1: Poisons of and poisoning caused by tremorgenic mycotoxins of *Aspergillus clavatus*. 1975. L.A.P. Anderson

AGRICULTURAL RESOURCE UTILISATION LANDBOUHHULPBRONBENUTTING

RESOURCE RESEARCH/HULPBRONNAVORSING

Primary resources/Primêre hulpbronne

SOIL/GROND

• *Soil science/Grondkunde*

- GB.5111/32/1/3: Soil fertility - a basis according to which soils can be grouped. 1975. A.J. van der Merwe
- GB.5111/32/2/1: The isolation, identification, quantitative determination and chemical reactions of growth stimulating and inhibiting organic compounds in soil and crop residues of summer and small grains. 1980. P. de L. R. Swartz
- GB.5111/32/3/1: The distribution and properties of liming materials and waste products with reference to suitability for amelioration of RSA soils. 1979. H.C.H. Hahne
- GB.5111/32/3/2: Silicon-phosphorus-sesquioxide relationships with a view to amelioration of acid soils with silicate. 1979. H.C.H. Hahne
- GB.5111/32/3/4: Ad hoc mineralogical analyses and investigations. 1982. W.F.A. Kirsten
- GB.5111/32/3/5: Morphological and mineralo-chemical studies of some South African podzols and podzolised soils. 1982. L.C. Hawker
- GB.5111/32/3/7: The dynamics of neutralising agents of porous inert media and soil in a larger area. 1985. A.J. van der Merwe
- GB.5111/32/3/8: A study on the formation, characteristics and properties of disturbed surface layers on quartz grains and the influence thereof on the behaviour of sandy soils. 1989. J.N.J. Viljoen
- GB.5111/32/3/10: A study of the mineralogy of the Arcadia soils. 1990. C. Bühmann
- GB.5111/32/4/3: The quantitative description of the soil water regimes of selected crop ecotopes. 1985. M. Hensley
- GB.5111/32/4/4: The water regime of a Clansthal soil series under dryland maize production in the Western Transvaal. 1988. D. Haarhoff
- GB.5111/32/4/5: The estimation of evaporation from the soil surface in the rain-fed wheat and maize cultivation areas. 1989. H.W. Hattingh
- GB.5111/32/5/1: The quantitative characterisation of a porous medium, e.g. soil. 1981. D.A. Russell
- GB.5111/32/5/2: Quantitative characterisation of the physical genesis of soil particulate material. 1981. D.A. Russell
- GB.5111/32/5/3: The micro morphology of South African soils. 1989. D.A. Russell
- GB.5111/32/6/1: Detailed description of the soils of RSA (first approximation). 1983. J.L. Schoeman
- GB.5111/32/7/2: The investigation of chemical weathering on granites and felsites under different climate conditions. 1986. P.J. Claassen
- GB.5111/32/7/3: The nature and genesis of black and red soils in the Springbok Flats and Rustenburg district. 1987. P.L.C. Grubb
- GB.5111/32/8/1: The significance of ammonia losses from a range of RSA soils under laboratory conditions and to develop a model to be used to minimise such ammonia losses under field conditions. 1986. A.D.P. Botha
- GB.5111/32/8/2: The significance of N losses by means of denitrification in the RSA soils. 1985. A.D.P. Botha

- GB.5111/32/8/3: A study of some South African soils in which K fixation is a problem. 1985. W.F.A. Kirsten
- GB.5111/32/8/4: Hydrolysis of urea in the summer rain cropping soils. 1985. E.M. Jooste
- GB.5111/32/8/5: Extractable soil nitrogen: evaluation of factors affecting the reliability of the equilibrium method using Auto Analyser methods for the determination of nitrogen. 1986. J.C. Johnson
- GB.5111/32/8/6: S status of soils under dryland cultivation in the summer rain cropping area. 1987. P.L. MacGregor
- GB.5111/32/8/7: The presence and distribution of anorganic nitrogen in soils. 1986. A.D.P. Botha
- GB.5111/32/9/1: Neutralisation of acid subsoil. 1986. A.J. van der Merwe
- GB.5111/32/9/2: Plant nutrition at high levels of neutralisation. 1987. A.J. van der Merwe
- GB.5111/32/9/3: Uptake and translocation of calcium and other nutrients by plants under acid soil conditions. 1989. A.J. van der Merwe
- GB.5111/32/10/1: The irrigability of the Valsrivier soil form. 1989. J.P. Nell
- H.5111/32/1/3: Soil: amelioration of soil acidity and associated effects on plant nutrient availability. 1988. A.D. Manson
- H.5111/32/3/4: Soil: the influence of plant density and stubble load on the soil water regime and yield of maize. 1986. A.M. Hattingh
- H.5111/32/4/1: The effects of different stubble mulch practices on the soil water and other physical properties of a Rensburg series. 1984. D.J. Beukes
- H.5111/32/5/1: The effects of different levels of phosphorus and nitrogen on crop yield on a Rensburg soil series under stubble mulch tillage in the Highveld Region. 1984. D.J. Beukes
- H.5111/32/5/2: Soil: the influence of certain soil properties and phosphorus carriers on the selection of an extracting agent for the determination of soil phosphorus. 1988. M. Pretorius
- H.5111/32/6/1: An investigation into the macro-element status of soils in different land types in the Highveld Region. 1984. R.W. Bruce
- H.5111/32/7/1: Soil recompaction rate of soils as influenced by depth of cultivation, clay and soil water content. 1989. A.M. Hatting
- H.5111/32/8/8: P isotherms as a quick and cheap alternative to field trials for calibration of the classical soil extractants. 1987. P.C. Henry
- N.5111/32/1/1: Evaluation of scooped soil density as a rapid measure of phosphorus fixation and soil texture. 1985. M.A. Johnston
- N.5111/32/1/2: Soil: phosphorus reaction in the soil and the evaluation of phosphorus status with regard to various phosphorus carriers. 1987. G.R. Thibaud
- T.5111/32/1/1: Soil: co-operative fertilisation and liming field trials in collaboration with the extension service in the Transvaal Region. 1970. W.F. van Wyk
- T.5111/32/1/4: Soil: amelioration of soil acidity for optimum maize production. 1980. G.J. du Toit
- T.5111/32/1/5: Soil: nitrogen phosphorus and potassium fertilisation on different soils for maize production. 1980. G.J. du Toit
- T.5111/32/1/6: Soil: band placing versus plough-in of phosphorus for maize production. 1980. G.J. du Toit
- T.5111/32/1/7: Soil: potassium fertilisation for maize production on soils differing in levels of potassium. 1980. G.J. du Toit
- V.5111/32/1/2: Soil: phosphorus status of and supply to different soil series in the Free State Region. 1979. P.J. Snyman
- V.5111/32/1/6: Soil: the effect of fertilisers on the sulphur status in a Hutton soil at Glen. 1984. A. van Schalkwyk

- V.5111/32/1/7: Soil: the availability of phosphorus in a Mangano soil for dryland wheat at Sandvet. 1985. P.J. Snyman
- V.5111/32/1/8: Soil: the availability of phosphorus in a Hutton soil for dryland wheat at Glen. 1984. P.J. Snyman
- V.5111/32/1/9: Soil: the effect of fertiliser on the sulphur status of a Dundee soil at Upington. 1985. A. van Schalkwyk
- V.5111/32/1/10: Soil: the determination of critical test values of sulphur for lucerne production on a soil of the Mangano series. 1985. J. de V. Nel
- W.5111/32/1/1: The macro-element status of soils of the winter rain cropping area. 1968. G.R. Thompson
- W.5111/32/2/1: Soil: a study of the correlations between chemically extractable phosphorus and phosphorus absorption by different crops in the Winter Rainfall Region. 1974. G.R. Thompson
- W.5111/32/2/3: The effect of gypsum on the yield of winter cereals on shallow, saline soils of the winter rain cropping area. 1980. C.P. de L. Beyers
- W.5111/32/3/1: The preparation of monoliths of representative soil types in the winter rain cropping area. 1976. G.R.C. Cooper
- W.5111/32/3/5: The movement and management of water in a stony irrigated soil in the Breë River Valley. 1990. F.H. Knight
- W.5111/32/4/1: The effect of soil type on the interaction between N and P in the Winter Rainfall Region with small grain types as indicator plants. 1985. G.R. Thompson
- W.5111/32/5/1: Determination of nitrogen mineralisation potential of representative soils in the Winter Rainfall Region. 1986. G.R.C. Cooper
- W.5111/32/5/2: Soil nitrogen availability as measured by various extractants and its relation to the response of small grain to N fertiliser applied to field plots. 1986. G.R.C. Cooper

WATER

• *Water requirements/ Waterbehoefies*

- GB.5112/31/1/4: Flood irrigation design criteria establishment for major South African soils. 1981. D.A. Russell
- GB.5112/31/2/1: Determination of water requirements of certain annual crops at Roodeplaat as a function of soil, plant and atmospheric factors. 1976. A.J. van der Merwe

• *Soil science/ Grondkunde*

- GB.5112/32/1/1: Reclamation of salt and sodic soils: influence of exchangeable sodium, exchange equilibria and electrolyte concentration of irrigation water. 1972. H.J.C. Smith
- GB.5112/32/2/1: Soil properties and soil treatments affecting crust formation, run-off control and water erosion. 1988. R. Steyn

CLIMATE/KLIMAAT

• *Meteorology/ Weerkunde*

- GB.5113/33/1/1: Acquisition and processing of climatic data of the RSA. 1978. A.V. Kotze
- GB.5113/33/1/2: Climate: drought investigation in order to provide an index for drought determination from meteorological data. 1979. J.C. Venter
- GB.5113/33/1/3: Agroculture of subtropical crops. 1978. N.B. Human
- GB.5113/33/2/3: The influence of climate on cotton. 1978. J.F. Eloff

- GB.5113/33/2/5: The influence of climate on the occurrence of internal breakdown in plums in the winter rain cropping area. 1983. G.W. Matthee
- GB.5113/33/2/6: The influence of climate on the occurrence of premature ripening of Bon Chretien pears in the winter rain cropping area. 1983. J. Myburgh
- GB.5113/33/2/8: Determination of stress in maize as a result of soil-plant-atmosphere conductance with special reference to surface temperature and stomatal resistance. 1985. W.J. van den Berg
- GB.5113/33/2/9: Climate: the testing of yield models for wheat for use in the winter rain cropping area. 1986. M. Galloway
- GB.5113/33/2/10: Yield forecasting for citrus in the different production areas. 1981. N.B. Human
- GB.5113/33/2/12: Climate: the development of a yield model for Karoo shrubveld with a view to drought evaluation. 1988. J.C. Venter
- GB.5113/33/3/1: Microclimatic study of the Theewaterskloof Dam terrain. 1978. G.K. Viljoen
- GB.5113/33/3/4: Climate: the influence of wind and windbreaks on apple production. 1981. G.K. Viljoen
- GB.5113/33/3/5: Climate: the influence of trellis form on radiation absorption and CO₂ assimilation by vines. 1989. Adèle Darvall

• *Modelling/Modellering*

- V.5113/42/1/1: Climate: a study of climatic and veld production data in the RHFA 4053 during the period 1930-1980 at Glen. 1982. H.J. Fouche

• *Remote sensing application/Afstandwaarnemingstoepassing*

- V.5113/45/1/1: Drought monitoring using meteorological and remote sensing data. 1987. J.F. Erasmus

Energy/Energie

FUELS/BRANDSTOWWE

• *Engineering/Ingenieurskunde*

- LI.5121/51/1/1: Research on and development of plant oils and alcohols for engines in agriculture. 1979. J. Fuls

Surveys and demarcation/Opnames en afbakening

SOIL SURVEYS/GRONDOPNAMES

• *Soil science/Grondkunde*

- D.5131/32/1/2: Soil surveys for run-off control planning on pineapple farms of the Western Study Group in the Bathurst/Alexandria area. 1986. L.R. Hall
- D.5131/32/1/3: Soil surveys for the combating of erosion on wheat farms in the Paterson area. 1987. L.R. Hall
- D.5131/32/1/4: Ad hoc soil surveys in the Eastern Cape Region. 1987. L.R. Hall
- D.5131/32/1/5: Soil surveys for combating of erosion and the planning of farms in the Buyskloof, Nanaga and Zuney areas of Alexandria. 1987. L.R. Hall
- D.5131/32/1/6: Soil surveys for the combating of erosion and the planning of farms in the Boknes and Kaba areas of the Alexandria district. 1988. L.R. Hall

- D.5131/32/1/7: Soil surveys for the planning of farms in the Joelshoek area of the Elliot Extension Ward. 1989. L.R. Hall
- D.5131/32/1/8: Soil surveys for water run-off control planning of farms and the improvement and implementation of irrigation methods in the Kwelera Valley of the East London district. 1990. L. Meyer
- GB.5131/32/1/1: Land type survey (terrain form, soils, climate) of the Highveld Region. 1979. J.N.J. Viljoen
- GB.5131/32/1/2: Land type survey (terrain form, soils, climate) of the Eastern Cape Region. 1973. F. Ellis
- GB.5131/32/1/3: Land type survey (terrain form, soils, climate) of the Free State Region. 1973. M Hensley
- GB.5131/32/1/4: Land type survey (terrain form, soils, climate) of Natal Region. 1973. K. Snyman
- GB.5131/32/1/5: Land type survey (terrain form, soils, climate) of Transvaal Region. 1973. J.L. Schoeman
- GB.5131/32/1/6: Land type survey (terrain form, soils, climate) of the Winter Rainfall Region. 1973. F. Ellis
- GB.5131/32/1/7: Land type survey (terrain form, soils, climate) of the Karoo Region. 1973. F. Ellis
- GB.5131/32/2/1: Standard 1:50 000 soil survey of the Pretoria-Witwatersrand-Vereeniging complex. 1973. T.U. Yager
- GB.5131/32/2/2: Standard 1:50 000 soil survey of the Cape Town-Moorreesburg-Worcester complex. 1975. F. Ellis
- GB.5131/32/3/1: Soil surveys and investigations for irrigation purposes. 1973. F. Ellis
- GB.5131/32/3/2: Soil surveys and investigations for purposes other than irrigation. 1974. J.L. Schoeman
- N.5131/32/1/1: Farm soil surveys in Natal Region. 1980. A.D. Manson

• *Remote sensing application/Afstandwaarnemingstoepassing*

- GB.5131/45/1/1: Soil surveys: investigation to evaluate Landsat-TM- and SPOT-data for mapping soils on a semi-detail scale. 1987. A.D. Argo

VELD SURVEYS/VELDOPNAMES

• *Situation analysis/Situasiebepaling*

- D.5132/35/1/1: The determination of the veld condition through veld surveys in the Dohne-Bolo area. 1980. H. Oosthuizen
- D.5132/35/1/2: Ad hoc veld condition surveys in the Eastern Cape Region. 1987. D.A. Dekker
- D.5132/35/1/3: The development of a computerised databank for the storage and retrieval of veld condition survey data. 1987. D.A. Dekker
- D.5132/35/1/4: Veld condition assessment of selected sites in the humid grass/bush communities of the Bathurst Extension Ward. 1987. D.A. Dekker
- D.5132/35/1/5: Veld condition assessment in the Bedford and Adelaide magisterial districts. 1987. D.A. Dekker
- D.5132/35/1/6: Veld condition surveys at Uitenhage/Fish River Valley bushveld. 1987. D.A. Dekker
- D.5132/35/1/7: Veld condition assessment manuals - Eastern Cape Region. 1988. D.A. Dekker

• *Potential studies/Potensiaalstudies*

- K.5132/36/1/1: Veld surveys: characterisation of key veld-soil potential classes in the Eastern mixed Karoo in terms of potential and present veld condition. 1985. M. Vorster

- K.5132/36/1/2: Veld surveys: characterisation of key veld-soil potential classes in the arid Karoo Region in terms of potential and present veld condition. 1986. M. Vorster
- K.5132/36/1/3: Veld surveys: characterisation of key veld-soil potential classes in the Bushmanland Karoo in terms of potential and present veld condition. 1986. M. Vorster
- V.5132/36/1/1: Defining of homogeneous areas: the identification description and defining of all Level I (veld) écotopes in the Free State Region. 1990. H.J. Brink

• *Conservation studies/Bewaringstudies*

- K.5132/38/1/1: Veld surveys: determination of the erosion condition of the veld and lands in Karoo Midlands subregion of the Karoo Region. 1986. P.E.C. van Pletzen
- K.5132/38/1/2: Veld surveys: determination of the erosion condition of the veld and lands in the north-eastern subregion of the Karoo Region. 1986. P.V. de Bruyn
- K.5132/38/1/3: Veld surveys: determination of the erosion condition of the veld and lands in the north-western Karoo subregion of the Karoo Region. 1986. G.J.J. Steenkamp
- K.5132/38/1/4: Veld surveys: determination of the erosion condition of the veld and lands in the Great Karoo subregion of the Karoo Region. 1986. C.J. Lourens

• *Remote sensing application/Afstandwaarnemingstoepassing*

- GB.5132/45/1/1: Veld surveys: mapping of natural veldtypes and rangeland degradation by various satellite systems. 1987. A.D. Argo
- GB.5132/45/1/2: An investigation to determine the potential of digital Landsat TM- and SPOT-data in identification of natural vegetation and changes thereof. 1988. L. Dreyer

FAIRLY HOMOGENEOUS AGRICULTURAL AREAS/REDELIK HOMOGENE BOERDERYGEBIEDE

• *Ecology/Ekologie*

- K.5134/27/1/2: RHFA: final ordination of land types suitable for veld grazing into reasonably homogeneous farming areas in the Karoo Region. 1986. M. Vorster
- K.5134/27/2/1: RHFA: classification of irrigation areas in the Extension Ward Cradock. 1980. P.S. van Heerden
- K.5134/27/2/2: RHFA: classification of irrigation areas in the Extension Ward Somerset East. 1985. P.S. van Heerden
- K.5134/27/3/1: Demarcation of fairly homogeneous agricultural areas in the Extension Ward Cradock. 1983. A.J. Siepker
- K.5134/27/3/2: Demarcation of fairly homogeneous agricultural areas in the Extension Ward Graaff-Reinet. 1983. A.J. Siepker
- K.5134/27/3/3: Demarcation of fairly homogeneous agricultural areas in the Extension Ward Jansenville. 1983. A.J. Siepker

• *Potential studies/Potensiaalstudies*

- H.5134/36/1/1: Demarcation of fairly homogeneous farming areas in the Highveld Region. 1981. J.J. Scheepers
- H.5134/36/1/2: The description of production possibilities of natural resources within 57 RHFAs in the Highveld Region. 1980. J.J. Scheepers
- H.5134/36/1/3: The provision of production norms and techniques for agricultural commodities for various resource situations within RHFAs of the Highveld Region. 1981. J.J. Scheepers

- H.5134/36/1/5: The classification of natural resources into ecotopes within 57 RHFAs in the Highveld Region. 1984. B.P. Ludick
- H.5134/36/1/6: An evaluation of the extent and distribution of top soil texture classes of soils deeper than 450 mm in the landtypes and RHFAs of the Highveld Region. 1987. J. Joubert
- K.5134/36/1/1: RHFA: ordination of land types suitable for crop production in the Great Brak, Great Fish and Little Fish Rivers into reasonably homogeneous farming areas in the eastern Karoo Region. 1985. M. Vorster
- N.5134/36/1/1: Demarcation of reasonably homogeneous farming areas in Natal Region and KwaZulu. 1988. K.G.T. Camp
- N.5134/36/1/2: The description of crop production possibilities of natural resources within the RHFAs in the Natal Region. 1988. J.M.B. Smith
- N.5134/36/1/3: The identification of the veld ecotopes influencing veld production and the establishment of veld production and the establishment of veld production norms within the RHFAs of the Natal Region and KwaZulu. 1988. K.G.T. Camp
- T.5134/36/1/1: RHFA: to demarcate reasonably homogeneous farming areas in the Transvaal Region. 1988. J.W. Filter
- T.5134/36/1/3: RHFA: the analysis and classification of rainfall and evapotranspiration data of the different RHFAs of the Transvaal Region. 1990. I.J. van Rensburg
- T.5134/36/1/7: The computerised processing of the soil conversion scheme and linking it to RHFAs in the database. 1989. J.C. van der Spuy

LAND USE/GRONDGEBRUIK

• *Potential studies/Potensiaalstudies*

- V.5135/36/1/1: Land use: collection of animal production norms and associated practices in the Vryburg magisterial district. 1988. P.J. Odendaal
- V.5135/36/1/2: Land use: collection of cultivated pasture norms and associated production practices in the Vryburg magisterial district. 1988. H.P. Brink
- V.5135/36/2/1: Land use: the development of a format for a computerised master agricultural resource database and related farming enterprise database in the Free State Region. 1988. G.M. Bartleman
- V.5135/36/2/2: Land use: the determination of technical specifications for computer equipment and the provision of software suitable for natural resource databases in the Free State Region. 1988. G.M. Bartleman

OTHER SURVEYS/ANDER OPNAMES

• *Situation analysis/Situasiebepaling*

- HK.5136/35/1/1: An investigation into woolled sheep farming in the Republic of South Africa. 1982. R.E.D. Bradfield
- HK.5136/35/2/1: Other surveys: an investigation into factors inhibiting the adoption of recommended veld management practices in the recognised grazing areas of the RSA. 1984. C.H. de Klerk
- HK.5136/35/3/1: Other surveys: an investigation into the adoption of recommended agricultural practices in the summer rain cropping areas owing to the provision of co-ordinated information to farmers. 1985. C.H. de Klerk

• *Potential studies/Potensiaalstudies*

- HK.5136/36/1/1: Other surveys: agricultural development plan for Rehoboth Gebiet. 1982. C.H. de Klerk

- K.5136/36/1/1: Other surveys: determination of stocking rate benchmarks in the Eastern mixed Karoo of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/2: Other surveys: determination of stocking rate benchmarks in the Karoo mountain areas of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/3: Other surveys: determination of stocking rate benchmarks in the central Karoo of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/4: Other surveys: determination of stocking rate benchmarks in the Great Karoo of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/5: Other surveys: determination of stocking rate benchmarks in the arid Karoo of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/6: Other surveys: determination of stocking rate benchmarks in Bushmanland of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/7: Other surveys: determination of stocking rate benchmarks in the western winter rainfall mountain Karoo of the Karoo Region. 1987. W. v.D. Botha
- K.5136/36/1/8: Other surveys: determination of stocking rate benchmarks in the Bush scrubveld of the Karoo Region. 1987. W. v.D. Botha

• *Extension science/Voorligtingkunde*

- HK.5136/40/1/1: Other surveys: an investigation into the efficiency of study groups in Transvaal. 1984. C.H. de Waal

Irrigation development/Besproeiingsontwikkeling

IRRIGATION PLANNING/BESPROEIINGSBEPLANNING

• *Crop science/Gewaskunde*

- T.5141/30/1/1: Irrigation planning: the influence of row spacing and plant density on the yield of maize under trickle irrigation. 1986. W.F. van Wyk

• *Situation analysis/Situasiebepaling*

- D.5141/35/1/1: The collection of data relating to existing irrigation practices in the Fish River irrigation area. 1987. R.F.M. Childs

• *Evaluation/Evaluasie*

- GB.5141/37/1/1: Evaluation of areas for irrigation development and farm layout on State Schemes. 1979. J. Myburgh
- GB.5141/37/1/2: Evaluation of existing irrigation schemes. 1982. J. Myburgh

RESOURCE UTILISATION RESEARCH (CROPS) HULPBRONBENUTTINGSNAVORSING (GEWASSE)

Field crops/Landgewasse

SUMMER GRAIN/SOMERGRAAN

• *Nutrition/Voeding*

- D.5211/05/1/1: Summer grain: NPK nutrition of maize at Dohne. 1978. R.S. Marr
- D.5211/05/1/2: Summer grain: NPK nutrition of maize at Sternberg. 1978. R.S. Marr
- D.5211/05/1/3: Summer grain: NP nutrition of maize at Sternberg. 1980. R.S. Marr

- D.5211/05/1/4: Summer grain: NP nutrition of maize at Ugie. 1980. R.S. Marr
- D.5211/05/1/5: Summer grain: nutrition of maize-phosphorus carriers and lime in the Tsitsikamma area. 1988. R.S. Marr
- *Pests/Plae*
- T.5211/20/1/1: Summer grain: survey of fungus-growing termites on agronomic crops. 1977. H.H. Gouse
- *Crop science/Gewaskunde*
- D.5211/30/1/1: Summer grain: maize planting dates at Dairyland, Bathurst. 1979. R.S. Marr
- D.5211/30/1/3: Summer grain: maize planting dates at Dohne. 1978. R.S. Marr
- D.5211/30/1/4: Summer grain: cultivar evaluation at Dohne. 1987. R.S. Marr
- D.5211/30/1/5: Summer grain: cultivar evaluation at Bathurst. 1987. R.S. Marr
- H.5211/30/1/1: Summer grain: verification of production techniques and yield norms for grain sorghum on an Arcadia soil form in the Highveld Region. 1985. G.H. Koen
- H.5211/30/1/2: Summer grain: the influence of tillage, seeding rate and fertilisation on the yield of grain sorghum on an Arcadia soil in the RHFA 6050 in the Highveld Region. 1986. G.H. Koen
- H.5211/30/1/3: Summer grain: the evaluation of production techniques and yield norms for grain sorghum on a Rensburg soil form in RHFA 6018 in the Highveld Region. 1986. G.H. Koen
- H.5211/30/1/4: The effect of row width and plant population on the growth and yield of grain sorghum on a Bainsvlei soil form in RHFA 6018 in the Highveld Region. 1988. G.H. Koen
- H.5211/30/2/1: Summer grain: verification of production techniques and yield norms for maize on a Bainsvlei soil form in the Highveld. 1985. H.S. Lombard
- H.5211/30/2/2: Summer grain: production techniques and yield norms for maize in the Highveld Region. 1986. P.J. Laubscher
- H.5211/30/2/3: Summer grain: soil tillage practices for maize on a Hutton and Avalon soil form in RHFA 6006 in the Highveld Region. 1986. P.J. Laubscher
- T.5211/30/1/1: Maize: the influence of between and within row spacing on soil water utilisation and yield under dryland conditions. 1988. I.D. Lamprecht
- T.5211/30/1/3: Maize: an investigation of the existing and alternative maize tillage methods of wide row spacings. 1989. W.F. van Wyk
- V.5211/30/1/1: Summer grain: irrigation and nitrogen fertilisation studies with maize at Upington. 1985. A. van Schalkwyk
- V.5211/30/1/2: Summer grain: irrigation and nitrogen fertilisation studies with maize at Vaalharts. 1985. A. van Schalkwyk
- V.5211/30/1/3: Summer grain: maize production under different irrigation systems at Vaalharts. 1986. A. van Schalkwyk
- V.5211/30/2/1: Summer grain: crop residue management and seedbed preparation practices for dryland maize in a monoculture system at Sandvet. 1986. C. Engelbrecht
- *Potential studies/Potensiaalstudies*
- D.5211/36/2/1: Summer grain: production and economic norms of no-till maize on a commercial scale at Dohne. 1983. J.A.G. Nel
- *Modelling/Modellerling*
- H.5211/42/1/1: The development of a simulation type model to predict production of the more important summer grains in the Highveld Region. 1985. P.J. van Rooyen

SMALL GRAIN/KLEINGRAAN

• Physiology/Fisiologie

- W.5212/03/1/1: Small grain: the biology of ridgetop brome (*Bromus diandrus*) in the Winter Rainfall Region. 1985. H.M. Ferreira

• Nutrition/Voeding

- W.5212/05/1/1: Small grain: the influence of time and amount of application of nitrogen fertiliser on wheat production in the Winter Rainfall Region. 1980. J.W. Loubser
- W.5212/05/1/2: Small grain: the influence of different nitrogen fertilisation rates on the nitrogen content of the plant and grain as well as a study of the resulting malting quality of barley. 1986. F.P. Goosen

• Pathology/Patologie

- V.5212/19/1/1: Small grain: the effect of cultivars, soil/water regime and *Fusarium inoculum* levels at planting time on dryland wheat production at Glen. 1985. O. Los
- V.5212/19/2/1: Small grain: investigations on the occurrence of root disease organisms of wheat in an experimental plot under irrigation at Vaalharts. 1985. O. Los
- W.5212/19/1/1: Small grain: factors influencing the occurrence and intensity of *Fusarium* root disease in wheat in the Winter Rainfall Region. 1988. L. Mills
- W.5212/19/1/2: Small grain: the influence of tillage and crop rotation on the incidence of take-all (*Gaeumannomyces graminis* var. *tritici*) in wheat in the Winter Rainfall Region. 1987. F.C.J. Bester
- W.5212/19/1/3: Small grain: the influence of tillage and crop rotation on the incidence of eyespot (*Pseudocercospora herpotrichoides*) in wheat in the Winter Rainfall Region. 1987. F.C.J. Bester

• Pests/Plae

- W.5212/20/1/1: Small grain: a study of the identity, occurrence, biology and ecology of aphids on small grain in the Winter Rainfall Region. 1975. S.S. Walters
- W.5212/20/1/2: The pest status of aphids associated with small grain in the Winter Rainfall Region. 1978. S.S. Walters
- W.5212/20/1/3: Small grain: bio-ecological study of *Sitobion avenae* on small grain in the winter rain cropping area of the Winter Rainfall Region. 1984. J.M. Laubscher
- W.5212/20/2/1: Small grain: biology and control of the dune mole-rat (*Bathergus suillus*). 1986. J. de V. Burger
- W.5212/20/3/1: Small grain: factors influencing the distribution and abundance of the dune snail, *Theba pisana* and related pest snails in the Winter Rainfall Region. 1986. J. de V. Burger

• Chemical control/Chemiese beheer

- W.5212/21/1/1: Chemical weed control of different broad leaf and grass weeds in small grain production in the Winter Rainfall Region. 1974. J.W. Loubser
- W.5212/21/1/2: The influence of chemical pre-emergence control of weeds on the yield of cereals in the Winter Rainfall Region. 1977. J.W. Loubser

• Crop science/Gewaskunde

- H.5212/30/1/2: The influence of sowing rates on the yield of wheat on a Clovelly soil form (Blinkklip serie) in RHFA 6034 in the Highveld Region. 1988. G.G.J. Oosthuizen

- H.5212/30/1/3: The influence of sowing rates on the yield of wheat on a Clovelly soil form (Annandale serie) in RHFA 6027 in the Highveld Region. 1988. G.G.J. Oosthuizen
- V.5212/30/1/1: Small grain: irrigation and nitrogen fertilisation studies with wheat in the Lower Orange River area at Upington. 1983. A. van Schalkwyk
- V.5212/30/1/9: Small grain: research on suitable dripper line spacings and irrigation scheduling of drip irrigated wheat at Vaalharts. 1989. A. van Schalwyk
- V.5212/30/1/2: Small grain: irrigation and nitrogen fertilisation studies with wheat in the Vaalharts irrigation area. 1983. A. van Schalkwyk
- V.5212/30/1/3: Small grain: irrigation and nitrogen fertilisation studies with wheat grown in rotation with maize at Vaalharts. 1984. A. van Schalkwyk
- V.5212/30/1/4: Small grain: determination of the water use of the short growing season wheat cultivar SST 25 under irrigation at Rietrivier. 1987. J.S. de Wet
- V.5212/30/1/5: Small grain: determination of the water use of the long growing season wheat cultivar Gamtoos under irrigation at Rietrivier. 1987. J.S. de Wet
- V.5212/30/1/6: Small grain: determination of the use of the wheat cultivar Gamtoos under irrigation at Vaalharts. 1987. J.S. de Wet
- V.5212/30/1/7: Small grain: determination of the water use of the wheat cultivar Gamtoos under irrigation at Upington. 1987. J.S. de Wet
- V.5212/30/1/8: Small grain: wheat production under different irrigation systems at Vaalharts. 1987. A. van Schalkwyk
- V.5212/30/1/9: Small grain: research on suitable dripper line spacings and irrigation scheduling of drip-irrigated wheat at Vaalharts. 1989. A. van Schalkwyk
- V.5212/30/2/1: Small grain: evaluation of crop residue management, soil tillage and wheat control practices within specific systems of dryland wheat production at Glen. 1982. P.J. Snyman
- V.5212/30/2/2: Small grain: evaluation of minimum tillage and stubble mulch practices in dryland wheat production at Glen. 1984. P.J. Snyman
- V.5212/30/2/3: Small grain: the effect of different soil management practices during long fallow preceeding dryland wheat on physical soil condition and occurrence of wind erosion at Bainsvlei. 1984. S.W.J. van der Merwe
- V.5212/30/2/4: Small grain: evaluation of minimum tillage and stubble mulch practices in dryland wheat production at Sandvet. 1984. P.J. Snyman
- V.5212/30/2/6: Small grain: influence of wheat production systems and methods of crop residue management on the occurrence of *Fusarium* crown rot and performance of some cultivar types on dryland at Hertzogville. 1991. O. Los
- W.5212/30/1/1: Small grain: the evaluation of released cultivars in respect of yield and quality in the Winter Rainfall Region. 1974. J.W. Loubser
- W.5212/30/2/1: Small grain: the influence of sowing date, seeding rate, variety, nitrogen application and disease control on yield and quality of barley in the Winter Rainfall Region. 1974. F.P. Goosen
- W.5212/30/2/2: Small grain: the influence of disease control, nitrogen fertilisation and seeding rate on the yield and nitrogen content of malting barley in the Winter Rainfall Region. 1985. F.P. Goosen
- W.5212/30/2/3: Small grain: the influence of disease control, nitrogen fertilisation and seeding rate on the yield and nitrogen content of malting barley under supplementary irrigation in the Winter Rainfall Region. 1985. F.P. Goosen
- W.5212/30/3/1: Small grain: the influence of sowing time, rate of seeding variety and nitrogen application on yield and quality of wheat in the Winter Rainfall Region. 1985. G.A. Agenbag
- W.5212/30/3/2: Small grain: influence of genotype, environment and nitrogen fertiliser on quality components of wheat in the Winter Rainfall Region. 1985. W.R.M. de Witt

- W.5212/30/4/1: Small grain: the effect of cultivation methods in different cropping systems on grain yield and soil improvement in the Swartland production area of the Winter Rainfall Region. 1975. G.A. Agenbag
- W.5212/30/4/2: Small grain: the effect of cultivation methods in different cropping systems on grain yield and soil improvement in the Ruens production area of the Winter Rainfall Region. 1976. G.A. Agenbag
- W.5212/30/4/3: Small grain: the effect of cultivation methods in different cropping systems on grain yield and soil improvement in the George-Knysna production area of the Winter Rainfall Region. 1979. P. Fouche
- W.5212/30/4/4: The effect of wheat straw on the appearance survival and vegetative growth of wheat (*Triticum aestivum*). 1989. N.C. Raath
- W.5212/30/5/1: A study of the adaptability of small grain species and cultivars in the Winter Rainfall Region for fodder grain purposes. 1985. J.J. Stander
- W.5212/30/6/1: The influence of chlormequat on growth and yield of cereals in the Winter Rainfall Region. 1987. L.W. Loubser
- W.5212/30/7/1: The effect of wild oats (*Avena fatua*) competition on growth and yield of wheat. 1989. J.W. Loubser

OIL AND PROTEIN SEEDS/OLIE- EN PROTEÏENSADE

• *Physiology/Fisiologie*

- W.5213/03/1/1: Oil and protein seeds: effect of time of application of a seaweed growth regulator on growth, development and seed yield of lupins. 1986. H.J.C. Agenbag

• *Upgrading/Veredelings*

- W.5213/07/1/1: Oil and protein seeds: upgrading of lupins for the winter rain cropping areas by means of genetic studies and breeding. 1981. H.J.C. Agenbag

• *Pests/Plae*

- H.5213/20/1/2: Determination of feeding damage by insects to pods and seeds of groundnuts in the Highveld Region. 1987. C.F. van Eeden

• *Chemical control/Chemiese beheer*

- W.5213/21/1/1: Oil and protein seeds: chemical control of powdery mildew (*Erysiphe polygoni*) on different cultivars of *Lupinus angustifolius*. 1986. H.J.C. Agenbag
- W.5213/21/2/1: Oil and protein seeds: chemical weed control in *L. albus* and *L. angustifolius* in the winter rain cropping area. 1986. J.W. Loubser

• *Crop science/Gewaskunde*

- H.5213/30/1/1: Oil and protein seeds: evaluation of plant population and row width for sunflowers on a Rensburg soil form in RHFA 6018 in the Highveld Region. 1986. H.S. Lombard
- H.5213/30/1/2: Oil and protein seeds: the effect of plant population on the yield of sunflower dwarf cultivars on a Rensburg soil series in RHF 6023 in the Highveld Region. 1989. S.P. van der Merwe
- H.5213/30/1/4: Oil and protein seeds: the effect of plant population on the yield of sunflower dwarf cultivars on a Soetmelk soil series in RHF 6006 in the Highveld Region. 1989. S.P. van der Merwe

- V.5213/30/1/1: Oil and protein seeds: groundnut production under different irrigation systems at Vaalharts. 1987. A. van Schalkwyk
- V.5213/30/1/2: Oil and protein seeds: research on suitable dripper line spacings and irrigation scheduling of drip irrigated groundnuts at Vaalharts. 1988. A. van Schalkwyk
- W.5213/30/1/1: Oil and protein seeds: a study of the adaptability and methods of cultivation of jojoba (*Simmondsia chenensis*) in the Winter Rainfall Region. 1980. D.J. le Roux
- W.5213/30/1/2: Oil and protein seeds: the evaluation of cultivars of different species of lupins with respect to adaptability disease resistance and yield in the Winter Rainfall Region. 1958. H.J.C. Agenbag
- W.5213/30/2/1: Oil and protein seeds: lupin cultivar evaluation in the Winter Rainfall Region. 1986. H.J.C. Agenbag
- W.5213/30/3/1: Oil and protein seeds: determination of optimum time of planting and plant density of different lupin varieties in the Winter Rainfall Region. 1986. H.J.C. Agenbag
- W.5213/30/3/2: Oil and protein seeds: effect of row spacing on plant development and seed yield of *Lupinus albus*. 1986. H.J.C. Agenbag
- W.5213/30/3/3: Oil and protein seeds: scientific crop studies on lupins in the Winter Rainfall Region. 1986. H.J.C. Agenbag

OTHER FIELD CROPS/ANDER LANDGEWASSE

• Crop science/Gewaskunde

- D.5214/30/1/4: Other field crops: crop rotation for chicory in the Eastern Cape. 1980. R.S. Marr
- V.5214/30/1/1: Other field crops: cotton production under different irrigation systems at Vaalharts. 1986. A. van Schalkwyk
- V.5214/30/1/2: Other field crops: investigation on certain soil cultivation practices and nitrogen fertilisation of raisin grapes (Sultanina) on a Hutton soil in the Lower Orange River region. 1989. A. van Schalkwyk
- V.5214/30/1/3: Oil and protein seeds: water use of soybeans as affected by plant population and potassium fertilisation under irrigation at Riet River. 1988. C. Janse van Rensburg
- W.5214/30/1/1: The evaluation of techniques and methods for application of nutrients and irrigation to other crops in a research glasshouse. 1984. H.H.M. van Gelder
- W.5214/30/2/1: Other field crops: the evaluation of peppermint (*Mentha piperita*) for adaptation in the Winter Rainfall Region. 1985. H.H.M. van Gelder
- W.5214/30/2/2: The influence of growth stage at harvest on the yield and quality of peppermint oil. 1986. H.H.M. van Gelder

Garden crops/Tuingewasse

TUBER CROPS/KNOLGEWASSE

• Pests/Plae

- W.5221/20/1/1: Tuber crops: the migratory habits of aphid vectors of potato viruses in the seed potato producing areas of the winter rain cropping area. 1976. S.S. Walters

• Crop science/Gewaskunde

- V.5222/30/1/1: Tuber crops: potato production under different irrigation systems at Vaalharts. 1989. A. van Schalkwyk

VEGETABLES/GROENTE

- *Physiology/Fisiologie*

- N.5222/03/1/1: Interactions between the stage of plant development and herbicide treatment in the expression of phytotoxic responses to phenoxyalkanoic herbicides. 1988. R.J. Bennet

- *Crop science/Gewaskunde*

- N.5222/30/1/1: Vegetables: cultivar evaluation of vegetables in the mist belt of the high rainfall areas of Natal and the effects of selected fungicides on foliar disease development. 1985. W.G. Nevill

OTHER GARDEN CROPS/ANDER TUINGEWASSE

- *Crop science/Gewaskunde*

- W.5223/30/1/1: Other garden crops: status determination with regard to the commercial utilisation of the Proteaceae in the Winter Rainfall Region. 1985. C.J. Eksteen

Fruit crops/Vrugtegewasse

GRAPES/DRUIWE

- *Pests/Plae*

- W.5232/20/1/1: Distribution and movement patterns of the Cape sparrow *Passer melanurus* (Müller) - a problem bird of grapes in the irrigation areas of the Winter Rainfall Region. 1985. M.J.F. Jarvis
- W.5232/20/1/2: Food composition and feeding habits of the Cape sparrow *Passer melanurus* (Müller) - a problem bird of grapes in the irrigation areas of the Winter Rainfall Region. 1985. M.J.F. Jarvis
- W.5232/20/1/3: Control techniques for the Cape sparrow *Passer melanurus* (Müller) in grapes in the irrigation areas of the Winter Rainfall Region. 1985. M.J.F. Jarvis

RESOURCE UTILISATION RESEARCH (ANIMALS) HULPBRONBENUTTINGSNAVORSING (DIERE)

Ruminants/Herkouers

LARGE STOCK/GROOTVEE

- *Physiology/Fisiologie*

- D.5311/03/1/2: Large stock: protein energy status and calving percentage of beef cows and heifers in the sourveld. 1980. J.A. Erasmus
- D.5311/03/2/1: Large stock: the influence of kikuyu on the sexual maturity of Friesian heifers. 1984. J.A. Erasmus
- D.5311/03/2/2: Large stock: influence of kikuyu on the protein and energy status as well as certain endocrinological secretions in cows. 1984. W.P. Henning
- D.5311/03/2/3: Large stock: influence of kikuyu pastures on the protein and energy status of dairy heifers. 1984. J.A. Erasmus
- T.5311/03/1/2: Large stock: influence of different over-wintering feeding regimes on production and growth of beef cattle. 1971. S.D. Nieman

- T.5311/03/1/3: Large stock: milk and meat production from a dual purpose breed on natural veld and dryland *Cenchrus* pastures. 1984. E.E. Lademann
- T.5311/03/1/4: Large stock: management of a dairy unit on a small farming unit utilising cultivated pastures. 1988. M.J. Meaker

• *Reproduction/ Reproduksie*

- N.5311/04/1/2: Oestrus and ovulation in mature female beef cattle as affected by changes in live mass. 1978. B.P. Louw
- N.5311/04/1/6: Large stock: the interaction between cow body condition and calving date and its effect on conception rate and intercalving interval in commercial beef herds at Dundee. 1988. J.S. Crichton
- V.5311/04/1/1: Large stock: an investigation on practical methods for shortening the intercalving period of Afrikaner cattle at Armoedsvlakte. 1979. J.A. Vermeulen

• *Nutrition/Voeding*

- D.5311/05/1/1: Large stock: the relationship in the seasonal variation in beta carotene of sourveld and beta carotene of blood plasma in beef cows. 1983. P.J.L. Zeeman
- D.5311/05/1/2: Large stock: the influence of beta carotene supplementation on the reproduction of beef cows. 1983. J.A. Erasmus
- D.5311/05/1/3: Large stock: the influence of reproduction on diet selection of beef cattle grazing high rainfall sourveld. 1983. P.J.L. Zeeman
- D.5311/05/1/4: Large stock: the influence of reproduction on diet selection of beef cattle grazing sweet grassveld. 1983. P.J.L. Zeeman
- D.5311/05/2/1: Large stock: the evaluation of kikuyu pastures for milk production. 1984. W.P. Henning
- D.5311/05/2/2: Large stock: the evaluation of kikuyu pastures for dairy heifers. 1984. P.J. Olivier
- D.5311/05/2/3: Large stock: the influence of alkali treatment of whole maize on milk production. 1984. W.P. Henning
- D.5311/05/2/4: Large stock: serum and plasma mineral profiles of dairy heifers on kikuyu pastures. 1987. P.J. Olivier
- H.5311/05/1/2: Large stock: optimal summer utilisation of fertilised and unfertilised veld with year-old steers. 1982. A.R. Schutte
- H.5311/05/1/3: Large stock: the optimal level of phosphorus supplementation for beef cows on summer veld in the Highveld Region. 1985. A.R. Schutte
- H.5311/05/1/4: Large stock: the provision of a protein-energy lick for beef cows on summer veld in the Highveld Region. 1985. A.R. Schutte
- H.5311/05/2/2: Large stock: the utilisation of ensiled mixtures of cattle manure and maize crop residues by large stock. 1983. L.D. Snyman
- H.5311/05/2/4: Large stock: the fattening of weaner beef steers on maize-, grain sorghum- and forage sorghum-silage. 1986. A.R. Schutte
- H.5311/05/3/3: Large stock: the inclusion of different buffer levels in starter concentrates for dairy calves. 1985. C.W. Cruywagen
- H.5311/05/3/4: Large stock: the effect of curd forming ability of colostrum on the absorption of antibodies in dairy calves. 1985. C.W. Cruywagen
- H.5311/05/3/5: Large stock: different concentrate to roughage ratios in complete rations for Friesland bull calves. 1985. C.W. Cruywagen

- H.5311/05/3/6: Large stock: the effect of curd forming ability of a milk replacer on its digestibility and body mass gain of Friesian bull calves. 1986. C.W. Cruywagen
- H.5311/05/3/7: Large stock: the effect of level of milk feeding and weaning age on pre- and post-weaning growth of Friesian bull calves. 1986. Joretha G. Horn
- H.5311/05/4/3: Large stock: milk production with maize silage or pasture as sources of roughage for dairy cows. 1984. Joretha G. Horn
- H.5311/05/5/1: Large stock: the utilisation of cultivated summer pasture by Friesland heifers from weaning up to six months of age. 1985. Joretha G. Horn
- H.5311/05/5/2: Large stock: the utilisation of cultivated winter pasture by Friesland heifers from weaning up to six months of age. 1985. Joretha G. Horn
- H.5311/05/5/3: Large stock: the dry matter intake and mass gain of Friesland heifers (spring calves) from six to 24 months of age on cultivated pasture. 1985. Joretha G. Horn
- H.5311/05/5/4: Large stock: dry matter intake and mass gain of Friesland heifers (autumn calves) from six to 24 months of age on cultivated pasture. 1986. Joretha G. Horn
- H.5311/05/6/1: Large stock: in vitro evaluation of the grain of different sorghum varieties for possible inclusion in concentrates of dairy cows. 1985. C.W. Cruywagen
- H.5311/05/6/3: Large stock: replacing maize meal with sorghum grain in dairy cattle diets. 1988. C.W. Cruywagen
- H.5311/05/7/1: Large stock: the finishing of year-old Simmentaler steers on Smuts finger grass (*Digitaria eriantha*) summer grazing. 1987. A.R. Schutte
- H.5311/05/8/1: Large stock: nutritive value of the more and less acceptable plant parts of maize residues as a whole. 1986. L.D. Snyman
- H.5311/05/8/2: Large stock: chemical composition and in vitro dry matter digestibility of different forms of utilisation of grain sorghum residues. 1986. L.D. Snyman
- N.5311/05/2/1: Large stock: evaluation of *E. curvula* silage ensilaged at the May cutting stage for overwintering replacement of beef cattle heifers. 1981. A. van Niekerk
- N.5311/05/2/3: Large stock: utilisation of maize residues by pregnant beef cows in the high rainfall sourveld area at Dundee. 1985. J.S. Chrichton
- N.5311/05/2/4: Large stock: varying methods of utilisation of maize residues by pregnant beef cows in Bioclimatic Region 8 of the sandy sourveld. 1990. W.D. Gertenbach
- N.5311/05/3/2: Large stock: chemical composition and nutritive value of Tall Fescue pasture for lactating dairy cattle in the high rainfall area at Cedara. 1980. T.J. Dugmore
- N.5311/05/3/3: Large stock: the causes of nutritional disorders of dairy cattle grazing kikuyu pastures damaged by army worms in the high rainfall sourveld area at Cedara. 1985. P.E. Bartholomew
- N.5311/05/3/4: Large stock: the effect of nitrogen status and stage of regrowth on the chemical composition, nutritive value, dry matter intake and milk production potential of kikuyu herbage. 1987. T.J. Dugmore
- N.5311/05/3/5: Large stock: nutrition - a survey of the iodine status of dairy cattle in Natal as reflected in the iodine content of milk. 1986. C.N. McVicar
- N.5311/05/3/6: Large stock: the effect of different levels and systems of concentrate allocation on the productivity of dairy cows grazing cultivated pastures at Cedara. 1987. T.J. Dugmore
- N.5311/05/3/7: Large stock: nutrition - the quality and utilisation of protein from cultivated pastures for milk production at Cedara. 1988. B.J. van der Merwe
- T.5311/05/1/1: Large stock: supplementary feeding of beef cattle cows with calves in the sweet bushveld. 1965. C.J.F. Lüdemann

- T.5311/05/1/2: Large stock: supplementary feeding on sweet bushveld and finishing in pens of growing beef cattle. 1965. C.J.F. Lüdemann
- T.5311/05/1/3: Large stock: supplementary feeding of growing cattle in the high rainfall sourveld. 1971. S.D. Nieman
- T.5311/05/1/4: Large stock: the effect of levels of winter feeding and age at marketing of steers on beef production. 1988. S.D. Nieman
- V.5311/05/1/3: Large stock: different levels of phosphorus supplementation of beef cows at Armoedsvlakte. 1984. M.V.P. Read
- V.5311/05/1/6: Large stock: the influence of rate of fermentation in the rumen on voluntary intake from the pasture by beef cattle on veld of Armoedsvlakte. 1987. M.L. Jonker
- V.5311/05/1/7: Large stock: the influence of rate of fermentation in the rumen on voluntary intake from the pasture by beef cattle on veld of Vaalharts. 1988. M.L. Jonker
- V.5311/05/1/8: Large stock: the influence of rate of fermentation in the rumen on voluntary intake from the pasture by beef cattle on veld of Glen. 1987. H.O. de Waal
- V.5311/05/1/9: Large stock: the influence of phosphorus status of beef cattle on their production and reproduction on veld of Vaalharts. 1989. M.L. Jonker
- V.5311/05/1/10: Large stock: the influence of phosphorus status of beef cattle on their production on veld of Koopmansfontein. 1989. M.L. Jonker
- V.5311/05/1/11: Large stock: feed intake digestibility and crude protein content of the diet of beef cattle at two stocking rates on veld of Vaalharts. 1989. M.L. Jonker
- V.5311/05/2/1: Large stock: the application of cultivated roughages for milk production at Glen. 1978. S.W. Matthee
- V.5311/05/2/2: Large stock: the influence of frequency of concentrate feeding on the utilisation of roughage by dairy cows at Glen. 1983. S.W. Matthee
- V.5311/05/2/3: Large stock: the evaluation of annual rye grass for milk production at Glen. 1985. S.W. Matthee
- W.5311/05/1/1: Cultivated kikuyu pastures as a source of food for dairy cows in the Winter Rainfall Region. 1980. P.J. Swart
- W.5311/05/2/2: Large stock: the substitution of oat hay with ammoniated wheat straw in growth rations for dairy breed heifers in the winter rain cropping area. 1984. E.D. D'Hangest D'yvoy
- W.5311/05/2/3: The substitution of lucerne hay with ammoniated wheat straw in full-feed rations for lactating dairy cows in the Winter Rainfall Region. 1988. E.D. D'Hangest D'yvoy
- W.5311/05/3/1: The economic implications of concentrate and hay supplementation of dairy cows on artificial pastures. 1984. C.J.C. Muller
- W.5311/05/3/2: Large stock feeding: an economic evaluation of milk production with Jersey cows on established pasture with and without concentrate and hay supplementations and a zero-grazing system in the Winter Rainfall Region. 1987. C.J.C. Muller
- W.5311/05/4/1: Large stock: an investigation of the nutritional value of oats: grazing vetch silage as a feed source for lactating dairy cows in the Winter Rainfall Region. 1987. E.D. D'Hangest D'yvoy
- *Upgrading/Veredeling*
- D.5311/07/1/1: Large stock: upgrading of the Edelheer and Roodebos Bonsmara breed strains in the high rainfall sourveld area. 1980. J.A. Erasmus
- D.5311/07/1/2: Large stock: performance testing of bulls from the Edelheer and Roodebos Bonsmara strains in the high rainfall sourveld area. 1980. J.P. Compaan

- H.5311/07/1/1: Large stock: the influence of genetic and environmental factors on production traits of an Afrikaner cattle herd. 1983. J.J. Viljoen
- H.5311/07/1/2: Large stock: the influence of genetic and environmental factors on production traits of a Simmentaler cattle herd. 1986. J.J. Viljoen
- T.5311/07/1/1: Large stock: the comparison of pure and cross-bred beef cattle in different breeding systems for the Sweet bushveld. 1965. C.J.F. Lüdemann
- T.5311/07/1/2: Large stock: development and improvement of the Edelheer, Roodebos and Wesselsvlei breeding lines of the Bonsmara beef cattle race in the Sour mixed bushveld at Roodeplaat. 1971. G. Marincowitz
- V.5311/07/1/4: Large stock: the evaluation of the Belmont Red and Bonsmara beef breeds under extensive conditions at Vaalharts. 1982. H.S. Pottas
- V.5311/07/1/5: Large stock: the development and upgrading of the Wesselsvlei strain at Armoedsvlakte. 1980. H.S. Pottas
- V.5311/07/1/6: Large stock: the upgrading of Belmont Red halve crosses to an additional Bonsmara breeding line. 1986. H.S. Pottas
- *Management/Bestuur*
- N.5311/41/1/4: Large stock: effect of stocking rate on the fertility and performance of beef cattle and the veld in the Highland sourveld, 4f, of Natal. 1984. A.D. Lyle
- N.5311/41/1/5: The influence of stocking rate on veld on the performance of the beef cow herd in the Sandy sourveld areas at Dundee. 1987. J.S. Crichton
- N.5311/41/2/2: Large stock: beef production on *A. macrum* and *D. eriantha* in bioclimatic region 8 of the High rainfall sourveld. 1983. A.P. van Schalkwyk
- N.5311/41/2/3: Large stock: the utilisation of Fescue/clover pasture by beef weaner calves in the High rainfall sourveld areas at Cedara. 1986. B.P. Louw
- N.5311/41/2/4: Large stock: the influence of weaning age and pasture management system on cow and calf performance on kikuyu in the High rainfall sourveld areas at Cedara. 1986. B.P. Louw
- N.5311/41/2/5: Large stock: the influence of wintering level and stocking rate on the performance of yearling steers on kikuyu in the High rainfall sourveld areas at Cedara. 1986. B.P. Louw
- N.5311/41/2/6: Large stock: characterisation of *D. eriantha* pasture during the growing season for beef production in bioclimatic region 8 of the High rainfall sourveld. 1987. A.P. van Schalkwyk
- N.5311/41/2/7: Characterisation of *A. macrum* pasture during the growing season for beef production in bioclimatic region 8 of the High rainfall sourveld. 1987. A.P. van Schalkwyk
- N.5311/41/2/8: Large stock: management - the suckling behaviour of beef calves on intensive pastures at Cedara. 1988. I.B. Stewart
- N.5311/41/2/9: Large stock: the effect of energy supplementation and ionophores on the performance of yearling beef animals grazing kikuyu pastures. 1989. A. van Niekerk
- N.5311/41/3/2: Large stock: databank for the dairy herd on Cedara. 1981. T.J. Dugmore
- N.5311/41/3/3: Large stock: dairy herd management - estimation of a correction factor influenced by condition and stage of pregnancy, to obtain an adjusted mass of dairy cows for the CEDARA feed programme. 1989. B.J. van der Merwe
- T.5311/41/1/1: Large stock: beef cattle production on natural pasture supplemented with *Cenchrus ciliaris* on the Springbok Flats. 1973. G. Marincowitz

- T.5311/41/1/2: Large stock: a stable beef cattle production system for Mopani veld. 1968. C.J.F. Lüdemann
- T.5311/41/1/3: Large stock: the potential and profit margins of weaner, tollie and ox production systems in the bushveld. 1963. C.J.F. Lüdemann
- V.5311/41/1/1: Large stock: an investigation of the seasonal trend of milk production and the effect of calving date on production on certain selected farms. 1984. J.P. Lessing
- V.5311/41/2/1: Large stock: a weaner, long yearling and an ox production system with three beef cattle types on the veld of Vaalharts. 1988. H.S. Pottas
- W.5311/41/1/2: Large stock: the determination of the effect of a shade structure in open camps on the milk and reproduction parameters of lactating dairy cows in the Winter Rainfall Region. 1985. C.J.C. Muller
- W.5311/41/1/3: Large stock: the evaluation of semi-intensive housing systems with reference to micro-climate, height of roof and insulation for lactating dairy cows in the Winter Rainfall Region. 1985. C.J.C. Muller

SMALL STOCK/KLEINVEE

• *Reproduction/Reproduksie*

- K.5312/04/1/2: Investigation of retarded growth after weaning in Angora goats. 1987. P.R. King
- T.5312/04/1/1: Small stock: effect of energy, protein and NPN on the fertility of mutton sheep ewes. 1970. G. Marincowitz
- T.5312/04/2/1: Small stock: the sexual activity of Merino woolled sheep and their crosses. 1973. L. Bouwer
- V.5312/04/2/1: Small stock: the influence of progestogen and PMSG on the reproduction ability of Dorper ewes under veld conditions at Glen. 1988. A.S. Faure

• *Nutrition/Voeding*

- D.5312/05/1/1: Small stock: the relationship in the seasonal variation in the beta carotene of sourveld and the beta carotene levels of blood plasma in woolled sheep. 1983. P.J.L. Zeeman
- D.5312/05/1/2: Small stock: the influence of beta carotene supplementation on the reproduction of lactating ewes. 1983. J.A. Erasmus
- D.5312/05/1/4: Small stock: the influence of winter stress on the production response of Merino wethers. 1985. H.H. Barnard
- D.5312/05/1/5: Small stock: the influence of reproduction on the diet selection of woolled sheep grazing High rainfall sourveld. 1983. P.J.L. Zeeman
- D.5312/05/1/6: Small stock: the influence of reproduction on the diet selection of woolled sheep grazing sweetveld. 1983. P.J.L. Zeeman
- D.5312/05/2/2: Small stock: the influence of reproduction and veld condition on diet selection by Boer goats grazing Valley bushveld. 1986. P.J.L. Zeeman
- H.5312/05/1/1: Small stock: the potential of *Digitaria eriantha* spp. *eriantha* as summer grazing crop for woolled sheep. 1982. B.G.J. van Vuuren
- H.5312/05/1/2: Small stock: wintering of woolled sheep on *Digitaria eriantha* ssp. *eriantha* as foggage. 1983. B.G.J. van Vuuren
- H.5312/05/1/3: Small stock: determination of intake of *Eragrostis curvula* and *Medicago sativa* by means of direct measurement and the indirect chromium oxide-marker method with adult Merino ewes. 1984. B.G.J. van Vuuren

- H.5312/05/1/4: Small stock: intake and digestibility of grain sorghum, silage and lucerne hay by wethers. 1985. I.F. Nel
- H.5312/05/1/5: Small stock: maize and sorghum silage in finishing ration for weaned lambs. 1985. I.F. Nel
- H.5312/05/1/6: Small stock: maize and sorghum silage for gestating and lactating ewes. 1986. I.F. Nel
- H.5312/05/1/7: Small stock: the performance of woolled sheep ewes and lambs on dryland lucerne. 1985. I.F. Nel
- H.5312/05/1/11: Small stock: a laboratory investigation into the effect of growth stage, cutting number and method of preservation on the nutritive value of forage crops. 1986. L.D. Snyman
- H.5312/05/1/12: Small stock: the evaluation of phosphorus supplementation during summer to woolled sheep on veld and cultivated pastures at Potchefstroom. 1990. B.G.J. van Vuuren
- H.5312/05/2/1: Small stock: slaughter lamb production from winter cereal grazing in the eastern part of the Highveld Region. 1978. J.W. Cilliers
- H.5312/05/2/2: Small stock: intake and nutritive value of triticale and rye grass pasture for slaughter lambs. 1980. J.W. Cilliers
- H.5312/05/3/1: Small stock: the effect of the ratio of manure to maize crop residue on the feeding value of ensiled cattle manure crop residue mixtures. 1979. L.D. Snyman
- H.5312/05/3/2: Small stock: the feeding value of maize crop residue in comparison with that of *Eragrostis curvula* hay as feed for woolled sheep. 1982. L.D. Snyman
- H.5312/05/3/4: Small stock: chemical composition and in vitro digestibility of untreated and ammoniated maize, sorghum and sunflower crop residues. 1987. L.D. Snyman
- K.5312/05/1/2: Small stock: the effect of energy supplementation on Angora goats grazing noors (*Euphorbia coerulescens*) and Succulent mountain shrub veld. 1983. F.C. Hayward
- K.5312/05/1/3: Small stock: determination of the optimal level of energy supplementation to dry Angora goats on chopped noors. 1983. F.C. Hayward
- K.5312/05/2/1: Small stock: influence of the nutritive value of a ration on the voluntary intake of four small stock breeds. 1984. D. Wentzel
- K.5312/05/3/1: Small stock: determination of the minimum inclusion rate of roughage in a chocolate maize-roughage diet for growing and adult Angora goats. 1984. P.D. Grobbelaar
- K.5312/05/3/4: Small stock: the determination of the energy requirements of young growing Angora goats. 1988. M.J. Herselman
- K.5312/05/4/5: Small stock: determination of the optimum level of energy supplementation of Angora goats on lucerne hay. 1988. P.R. King
- K.5312/05/4/5: Small stock: evaluation of *Agave americana* (American aloe) as a feed for small stock. 1988. D.P. Human
- K.5312/05/5/1: Small stock: the effect of energy concentration on growth and the efficiency of feed conversion of Dorper lambs. 1986. P.G. Marais
- K.5312/05/6/1: Small stock: utilisation of fodder crops with Merino sheep in the Fish River irrigation scheme. 1982. A.G. Bezuidenhout
- K.5312/05/6/3: Small stock: the evaluation of fine woolled Merino sheep on cultivated pastures under irrigation. 1988. A.G. Bezuidenhout
- K.5312/05/6/4: Small stock: the influence of roughage supplementation on production of growing Angora goats grazing irrigated pastures. 1988. P.D. Grobbelaar

- N.5312/05/2/2: Small stock: nutrition - the influence of cattle: sheep ratio on the utilisation of maize residues at Dundee. 1989. W.D. Gertenbach
- N.5312/05/2/3: Small stock: nutrition - the performance of lactating ewes on maize residues at Dundee. 1988. J.S. Crichton
- N.5312/05/3/1: Small stock: lamb growth and milk production of the ewe on Italian rye grass. 1982. W.A. Botha
- N.5312/05/3/2: Small stock: the effect of nitrogen fertilisation on the chemical composition and nutritive value of Italian rye grass for woolled sheep. 1987. J.F. de Villiers
- N.5312/05/3/3: Small stock: nutrition - the performance of autumn lambing ewes on irrigated and dryland pasture at Kokstad. 1988. A.D. Lyle
- N.5312/05/3/4: Small stock: the effect of creep feeding on the performance of ewes and lambs on Italian rye grass at Cedara. 1988. J.F. de Villiers
- N.5312/05/3/5: Small stock: nutrition - performance of autumn-lambing ewes on foggage pastures at Dundee 1989. A.P. van Schalkwyk
- T.5312/05/1/1: Small stock: chemical composition and digestibility of veld as selected by fistulated woolled sheep. 1972. M.J. Bekker
- T.5312/05/2/1: Small stock: creep feeding and early weaning of woolled sheep lambs in South-eastern Transvaal. 1972. M.J. Bekker
- T.5312/05/2/3: Small stock: voluntary intake of urea and molasses-treated *Eragrostis curvula* hay in different physical forms by woolled sheep. 1972. M.J. Bekker
- T.5312/05/2/4: Small stock: a comparison of NPN and natural protein in winter licks to woolled sheep on rested veld. 1981. M.J. Bekker
- T.5312/05/2/5: Small stock: improved utilisation of dryland lucerne for slaughter lamb production by means of maize grain supplementation. 1984. C.D. Esterhuizen
- T.5312/05/2/6: Small stock: the seasonal fluctuation of nutritional values and the effect on wool growth and body mass of woolled sheep. 1985. M.J. Bekker
- T.5312/05/2/7: Small stock: growth of slaughter lambs on summer veld and the role of supplementary feeding of protein and energy. 1985. M.J. Bekker
- T.5312/05/2/8: Small stock: the nutritional potential of harvested lands of summer crops for sheep in the summer rainfall area. 1985. C.D. Esterhuizen
- T.5312/05/2/9: Small stock: relation between in vivo organic matter digestibility of certain roughages. 1990. C.D. Esterhuysen
- T.5312/05/2/9: Small stock: relation between in vivo and in vitro organic matter digestibility of certain roughages. 1990. C.D. Esterhuysen
- V.5312/05/1/2: Small stock: feed intake, digestibility and chemical composition of the diet of Dorper ewes at two stocking rates at Koopmansfontein. 1985. H.O. de Waal
- V.5312/05/1/3: Small stock: feed intake, digestibility and crude protein content of the diet of Dorpers on the veld of Massakloutjie. 1986. G.N. Esterhuysen
- V.5312/05/1/4: Small stock: the influence of rate of fermentation in the rumen of voluntary intake from the pasture by Dorper sheep on veld of Koopmansfontein. 1987. H.O. de Waal
- V.5312/05/2/1: Small stock: the influence of phosphorus status on the production and reproduction of Karakul ewes on veld of the Karakul Research Station. 1981. A.S. Faure
- V.5312/05/2/2: Small stock: the influence of nutrition during pregnancy on the pelt quality of Karakul lambs at the Karakul Research Station. 1982. G.N. Esterhuysen
- V.5312/05/2/3: Small stock: feed intake, digestibility and crude protein content of the diet of Karakul and Dorper ewes on veld of the Karakul Research Station. 1986. G.N. Esterhuysen

- V.5312/05/3/2: Small stock: the voluntary intake and digestibility of roughages by sheep at Glen. 1962. H.O. de Waal
- V.5312/05/3/3: Small stock: the influence of different levels of protein and energy supplements to lactating ewes on veld at Glen. 1979. H.O. de Waal
- V.5312/05/3/4: Small stock: the influence of salt (NaCl) on the function of rumen and performance of sheep on veld at Glen. 1985. H.O. de Waal
- V.5312/05/3/5: Small stock: the influence of salt (NaCl) on the function of rumen and performance of sheep on veld. 1983. H.O. de Waal
- V.5312/05/3/6: Small stock: feed intake, digestibility and crude protein content of the diet of Merino wethers at three stocking rates on veld at Glen. 1985. H.O. de Waal
- V.5312/05/3/7: Small stock: the influence of fermentation rate in the rumen on voluntary intake from the pasture by Merino sheep on veld of Glen. 1987. H.O. de Waal
- W.5312/05/1/1: Small stock: the nutritive value of plants, pastures and feedstuffs for sheep in the Winter Rainfall Region. 1980. A.A. Brand
- W.5312/05/2/1: Small stock: the nutritional value of *Medicago truncatula* (cultivar Jemalong) for sheep in the Winter Rainfall Region. 1976. T.T. de Villiers
- W.5312/05/4/1: Small stock: trace-element deficiencies and supplementation of sheep on cultivated kikuyu/rye grass pastures under irrigation in the George area. 1978. F.E. van Niekerk
- W.5312/05/4/2: Small stock: trace-element deficiencies and supplementation for sheep on kikuyu pastures under irrigation in the Stellenbosch area. 1983. F.E. van Niekerk
- W.5312/05/4/3: Small stock: trace-element deficiencies and supplementation of woolled sheep on lucerne-based cultivars in the Caledon area. 1985. F.E. van Niekerk
- W.5312/05/4/4: The effect of pasture composition, N-fertiliser level, stocking rate and season on the trace-element status of mutton-woolled sheep on irrigated pasture. 1986. F.E. van Niekerk
- W.5312/05/4/5: Small stock: trace-element deficiencies and supplementation of mutton and woolled sheep on cultivated dryland pastures in the Porterville area. 1985. F.E. van Niekerk
- W.5312/05/4/6: Small stock: trace-element deficiencies and supplementation of mutton-woolled sheep on cultivated grass-clover pastures under irrigation in the Worcester area. 1985. F.E. van Niekerk
- W.5312/05/4/7: Small stock: the area-mapping of trace-element deficient areas in the Winter Rainfall Region. 1986. N.M. Kritzinger

• *Upgrading/ Veredelings*

- D.5312/07/1/1: Small stock: upgrading of the Dohne Merino by performance testing. 1979. A.J. Fourie
- D.5312/07/1/2: Small stock: development of a genetic control flock for the Dohne Merino. 1979. A.J. Fourie
- D.5312/07/1/3: Small stock: phenotypic and genetic parameters in the Dohne Merino in the High rainfall sourveld areas of the Eastern Cape. 1979. A.J. Fourie
- D.5312/07/2/1: Small stock: genetic evaluation of two improved Boer goat genotypes. 1980. A.J. Fourie
- D.5312/07/2/2: Small stock: the relationship between production norms and the breed standards of the improved Boer goat. 1985. J.C. Scheltema
- K.5312/07/1/1: Small stock: the half-classing selection system as a method of selection for Merino sheep. 1966. J.J. Olivier

- K.5312/07/1/3: Small stock: development of a white woolled-mutton sheep for the Karoo and arid regions. 1969. J.J. Olivier
- K.5312/07/1/5: Small stock: evaluation of the Afrino in the Karoo and arid areas. 1986. J.J. Olivier
- K.5312/07/1/6: Small stock: an investigation of selection criteria for Afrino sheep. 1988. M.A. Badenhorst
- K.5312/07/2/1: Small stock: selection for meat production and fertility in Dorper sheep. 1969. P.G. Marais
- K.5312/07/2/2: Small stock: the conserving and maintaining of a Namaqua Afrikaner flock. 1984. J.J. Olivier
- K.5312/07/2/3: Small stock: evaluation of the Dorper in the Karoo and arid areas. 1986. J.J. Olivier
- K.5312/07/3/2: Small stock: the establishment and evaluation of a fine mohair flock. 1988. M.A. Badenhorst
- K.5312/07/4/2: The influence of nutritional stress on wool production and wool characteristics of genetic fine and strong woolled sheep. 1988. P.D. Grobbelaar
- K.5312/07/4/3: Small stock: upgrading of a genetic fine-wool Merino flock. 1989. A.G. Bezuidenhout
- K.5312/07/4/4: Small stock: the evaluation of fine-wool Merino sheep on cultivated pastures under irrigation. 1989. A.G. Bezuidenhout
- K.5312/07/5/1: Small stock: evaluation of imported cashmere producing goats (Ferals), the Boer goat and Boer goat x Feral crosses. 1988. A.W.D. Kotze
- T.5312/07/1/1: Small stock: evaluation of Merino F_1 crosses under intensive conditions. 1969. L. Bouwer
- T.5312/07/1/2: Small stock: evaluation of Merino F_1 woolled sheep crosses as mother ewes for second stage crossings. 1969. L. Bouwer
- T.5312/07/1/3: Small stock: evaluation of Merino F_1 crosses with reciprocal cross-breeding. 1969. L. Bouwer
- V.5312/07/1/1: Small stock: development of a specific grey-brown and silvery tipped chocolate brown pelt in Karakul sheep. 1962. A.S. Faure
- V.5312/07/1/2: Small stock: selection lines in Karakul sheep at the Karakul Research Station. 1963. A.S. Faure
- V.5312/07/1/3: Small stock: the maintenance of a black Karakul control flock at the Karakul Research Station. 1987. A.S. Faure
- V.5312/07/1/4: Small stock: the maintenance and improvement of black, brown and white Karakul studs at the Karakul Research Station. 1987. A.S. Faure
- V.5312/07/1/5: Small stock: the development of a brown fur type out of the Karakul. 1988. M.G. Steyn
- V.5312/07/1/6: Small stock: the description of Karakul pelt traits according to a linear scale. 1989. M.C. Steyn
- V.5312/07/2/1: Small stock: the maintenance of a Dorper control flock in the Free State Region at Koopmansfontein. 1985. H.S. Pottas
- V.5312/07/2/2: Small stock: the estimation of genetic change within as well as genetic variation between Dorper flocks in the Free State Region. 1985. H.S. Pottas
- V.5312/07/2/3: Small stock: an investigation into the magnitude of genotype x environment interaction in Dorper sheep under intensive and extensive conditions in the Free State Region. 1986. H.S. Pottas

- V.5312/07/3/1: Small stock: the scientific maintenance and improvement of a Merino stud at Glen. 1988. C.J. Louw
- W.5312/07/1/1: Genetic parameters, genetic progress and obtained correlated responses in a woolled sheep flock selected for an increased clean-fleece mass. 1970. S.W.P van der M. Cloete
- W.5312/07/1/3: Small stock: genetic progress because of two-way selection for or against lambs weaned/ewe mated in Merino sheep. 1987. S.W.P. van der M. Cloete
- W.5312/07/1/4: The determination of pelvic size in Merino, S.A. Mutton Merino and Dormer sheep, and the genetic and phenotypic relationships of pelvic size on lamb survival and ewe rearing ability. 1988. S.W.P. van der M. Cloete
- *Pests/Plae*
- D.5312/20/1/1: Small stock: development of control strategies against round worms in breeding ewes on pasture. 1984. H.H. Barnard
- D.5312/20/2/1: Small stock: a survey of the ecto- and endo-parasite burdens of Boer goats and game within two production systems based on veld condition in the Valley bushveld of the Eastern Cape Region. 1986. H.H. Barnard
- W.5312/20/2/1: Small stock: epidemiology and ecology of sheep nematodes on irrigated grass legume pastures with the view to the development of different control systems. 1989. R.K. Reinecke
- *Situation analysis/Situasiebepaling*
- D.5312/35/1/1: Small stock: the extent and occurrence of abortion of improved Boer goats in the bushveld of the Eastern Cape. 1981. H.H. Barnard
- *Potential studies/Potensiaalstudies*
- V.5312/36/1/1: Small stock: the influence of stocking rate on wool production on veld at Glen. 1985. C.J. Louw
- *Management/Bestuur*
- N.5312/41/1/1: Small stock: management - the influence of stocking rate and grazing system on the performance of sheep on kikuyu at Cedara. 1988. J.F. de Villiers
- N.5312/41/1/2: Small stock: management - the performance of ewes on kikuyu foggage at Cedara. 1988. J.F. de Villiers
- N.5312/41/2/1: Small stock: comparison of three lambing periods, spring, late summer and autumn, with Merino sheep in the high rainfall sourveld area, bioclimatic subregion 4f of Natal. 1984. A.D. Lyle
- T.5312/41/1/1: Small stock: production of Dorper sheep and Boer goats where ewes are mated three times in two years. 1972. G. Marincowitz
- T.5312/41/1/2: Small stock: production of Dorper sheep and Boer goats where ewes are mated once per year. 1972. G. Marincowitz
- T.5312/41/1/3: Small stock: the suitability of indigenous goats as utilisers of the non-grass component of the Transvaal bushveld. 1987. C.J.F. Lüdemann
- V.5312/41/1/1: Small stock: a comparison of three production systems with two sheep breeds for increased lamb production at Glen. 1978. W.P. Auret
- V.5312/41/1/3: Small stock: increasing production of Merino ewes on dryland lucerne in a spring lambing season at Glen. 1982. C.J. Louw

- V.5312/41/1/5: Small stock: the development of fat lamb production systems at Koopmansfontein. 1983. H.S. Pottas
- V.5312/41/1/6: Small stock: a comparison between a Karakul and Dorper production system under range conditions at the Karakul Research Station. 1985. A.S. Faure
- W.5312/41/1/1: Accelerated mating frequencies to increase lamb production of dual-purpose sheep on irrigated pastures. 1979. S.W.P. van der M. Cloete
- W.5312/41/2/1: Small stock: behaviour and other factors associated with perinatal lamb mortality in SA Mutton Merino and Dormer ewes. 1990. S.W.P. van der M. Cloete

• *Norm studies/Normstudies*

- K.5312/50/1/1: Small stock: investigation of weathering of wool in the Karoo Region. 1976. P.D. Grobbelaar
- K.5312/50/1/2: Small stock: influence of age on the production and properties of mohair. 1978. P.D. Grobbelaar
- K.5312/50/1/4: Small stock: the influence of feeding additional energy together with chopped noors on the quality and quantity of mohair produced by dry Angora goats. 1983. P.D. Grobbelaar

GAME/WILD

• *Nutrition/Voeding*

- D.5313/05/1/1: Game: diet selection and intake patterns of kudu and bush buck on Valley bushveld. 1986. P.J.L. Zeeman

• *Ecology/Ekologie*

- T.5313/27/1/1: A survey of veld condition, game condition and game stocking rates on a number of farms in the Mopanieveld. 1986. D.D. Snyman
- T.5313/27/1/2: A survey on veld condition, game condition and game stocking rates on a number of farms in the north-western Transvaal. 1986. M.J.S. Peel

Non-ruminants/Nie-herkouers

OSTRICHES/VOLSTRUISE

• *Reproduction/Reproduksie*

- W.5321/04/1/1: The effect of seasons and rest periods on the reproduction performance of ostriches in the Karoo and arid areas in the Winter Rainfall Region. 1984. D. Swart

• *Nutrition/Voeding*

- W.5321/05/1/1: Finishing of slaughter ostriches for optimal leather production above 75 kg live mass. 1984. D. Swart

• *Upgrading/Veredeling*

- W.5321/07/1/1: Genetic parameters for production and reproduction traits of the ostrich flock at Oudtshoorn Experiment Farm. 1974. D. Swart

- W.5321/07/1/2: Ostriches: production norms of wild type ostriches under farming conditions with the aim of breeding and improvement of the Oudtshoorn ostrich. 1989. D. Swart

- *Management/Bestuur*

- W.5321/41/2/1: Ostriches: a comparison between meal feeding and meal feeding plus irrigated pastures in rearing systems for ostrich chicks. 1984. D. Swart

- W.5321/41/3/1: Testing of chicken shelters for semi-intensive rearing of ostrich chickens in the Karoo and arid areas. 1982. D. Swart

PIGS/VARKE

- *Nutrition/Voeding*

- W.5322/05/1/1: Evaluation of barley as feed source in pig diets in the Winter Rainfall Region. 1983. R.C. Olckers

RESOURCE UTILISATION RESEARCH (PASTURE) HULPBRONBENUTTINGSNAVORSING (WEIDING)

Pasture/Weiding

VELD

- *Taxonomy/Taksonomie*

- D.5411/01/1/1: Veld: reference herbaria at Dohne. 1976. M.G. McMaster

- V.5411/01/1/1: Veld: the collection, identification and mountings of plants found in the Free State Region for the establishment of a herbarium at Glen. 1952. J.H.J. Potgieter

- *Physiology/Fisiologie*

- D.5411/03/1/2: Veld: crop growth rate of key grass species of the central grassveld in the Eastern Cape. 1980. J.E. Danckwerts

- D.5411/03/1/8: Veld: an investigation of some factors influencing the palatability of *Portulacaria afra* in the Valley bushveld. 1987. A.M. Ras

- D.5411/03/1/9: Veld: the development of biochemical techniques for identification of palatable and unpalatable *Portulacaria afra* individuals. 1989. A.M. Ras

- V.5411/03/1/1: Veld: a study of the carbohydrate status of the different plant parts of *Rhigozum trichotomum* during the season in a natural habitat at the Karakul Research Station. 1984. C.G.F. Richter

- V.5411/03/1/2: Veld: the characterisation of the pattern of photosynthesis and transpiration of *Rhigozum trichotomum* as influenced by light, water and temperature under veld conditions at Upington. 1985. C.G.F. Richter

- *Nutrition/Voeding*

- T.5411/05/1/1: Veld: fertiliser trial on veld pastures. 1949. G.T. Rootman

- *Pests/Plae*

- T.5411/20/1/1: Veld: the incidence and influence of harvester termites on natural grazing pastures in the bushveld. 1983. H.H. Gouse

- T.5411/20/1/2: Veld: a study of the occurrence of the harvester termite in the Transvaal Region. 1985. H.H. Gouse
- T.5411/20/1/3: Veld: a study of the influence of soil moisture and availability of dry food on populations of harvester termites in the bushveld. 1985. H.H. Gouse
- V.5411/20/1/1: Veld: a study of the harvester termite (*Hodotermes mossambicus*) on veld under different management systems at Glen. 1984. I.S. Venter
- V.5411/20/1/2: Veld: a study of the harvester termite (*Hodotermes mossambicus*) on veld under different veld management systems at Armoedsvlakte. 1984. I.S. Venter

• *Chemical control/Chemiese beheer*

- V.5411/21/1/1: Veld: a study of the effect of Graslan on the vegetation of the Thorn bushveld of the northern Cape at De Woud. 1983. C.G.F. Richter
- V.5411/21/1/2: Veld: a study of more economical and selective aerial applications of Graslan for the control of *Acacia mellifera* and associated woody invader plants in the northern Cape at Duncan. 1984. C.G.F. Richter
- V.5411/21/1/3: Veld: a study of more economical and selective aerial applications of Graslan for the control of *Terminalia sericea* and associated woody invader plants in the northern Cape at Soutbos. 1984. C.G.F. Richter
- V.5411/21/1/4: Veld: a study of more economical and selective aerial applications of Graslan for the control of *Tarchonanthus camphoratus* and associated woody invader plants in the northern Cape at Reivilo. 1984. C.G.F. Richter
- V.5411/21/1/5: Veld: a study of more economical and selective aerial applications of Graslan for the control of *Acacia mellifera* and associated woody invader plants in the northern Cape at Severn. 1984. C.G.F. Richter
- V.5411/21/1/6: Veld: a study of more economical and selective aerial applications of Graslan for the control of *Rhigozum trichotomum* and associated woody invader plants in the northern Cape at Hotazel. 1984. C.G.F. Richter

• *Ecology/Ekologie*

- D.5411/27/1/3: Veld: the competitive interaction between the woody and herbaceous components of bush-grass communities in the Eastern Cape Region. 1987. F.O. Hobson
- D.5411/27/2/1: Veld: identification of homogeneous vegetation units in the humid grassveld of the Eastern Cape Region. 1990. C.W. Stoltz
- H.5411/27/1/1: Veld: the botanical composition of the vegetation on different veld units. 1983. R.H. Drewes
- H.5411/27/1/2: Veld: plant species preference of cattle on different veld units. 1983. A.S. de Beer
- H.5411/27/1/3: Veld: growth curves of certain preferred grasses on different veld units. 1986. S.L. van Schalkwyk
- H.5411/27/1/4: Veld: patterns of plant succession on different veld units. 1983. S.L. van Schalkwyk
- H.5411/27/2/1: Veld: quantitative characterisation of veld ecotopes in the Highveld Region. 1984. R.H. Drewes
- H.5411/27/2/2: Veld: The reaction of the grass component on biotic factors in different ecotopes. 1988. F.P. Janse van Rensburg
- T.5411/27/1/1: Veld: second succession on bare Mopani veld pastures. 1964. G.T. Rootman
- T.5411/27/2/1: Veld: determination of the floristic composition of undergraded veld in various environments in the south-eastern Transvaal and assessment of the degree of degradation of veld on farms. 1987. D.L. Barnes
- T.5411/27/2/2: Veld: a study of spatial variations in the yield of veld in relation to soil parameters. 1988. D.L. Barnes

- V.5411/27/1/4: Veld: an investigation of the efficiency of two mechanical bush control methods on *Rhigozum trichotomum* at the Karakul Research Station. 1986. C.G.F. Richter
- V.5411/27/1/5: Veld: a study of the influence of different densities of *Acacia mellifera* (Black thorn) on the grass component in a natural habitat in the northern Cape. 1989. C.G.F. Richter
- V.5411/27/1/6: Veld: a study of the influence of different densities of *Grewia flava* (Brandy bush) on the grass component in a natural habitat in the northern Cape. 1990. C.G.F. Richter
- V.5411/27/1/7: Veld: a study of the influence of different densities of *Acacia erioloba* (Camel thorn) on the grass component in a natural habitat in the northern Cape. 1990. C.G.F. Richter

• *Crop science/Gewaskunde*

- T.5411/30/1/1: Veld: fertilisation of veld pastures in the North-eastern mountain sourveld. 1969. B.H. Beukes
- T.5411/30/1/2: Veld: growth and development of *Diheteropogon amplexans* and *Eulalia villosa* in veld pastures. 1973. G.D. Kotze
- T.5411/30/2/1: Veld: fertilisation of veld pastures in the north-eastern highveld. 1969. C.C. de Witt
- T.5411/30/2/2: Veld: influence of fertilisation and paraquat on the nutritional value of veld pastures. 1973. G.D. Kotze
- T.5411/30/2/3: Veld: utilisation of vlel pasture. 1987. A.D. Venter

• *Water requirements/Waterbehoefies*

- D.5411/31/1/4: Veld: water use by *A. karroo* as influenced by defoliation. 1984. W.R. Teague

• *Potential studies/Potensiaalstudies*

- D.5411/36/1/1: Veld: the browse grazing capacity of the valley bushveld in the Eastern Cape Region. 1984. G.C. Stuart-Hill
- D.5411/36/2/4: Veld: replacing grazers (cattle) with browsers (Boer goats): evaluation of animal performance and the maintenance of veld condition in thornveld. 1987. G.C. Stuart-Hill
- D.5411/36/4/1: Veld: a test of procedures for the re-establishment of *Portulacaria* in the Xeric succulent valley bushveld. 1990. G.C. Stuart-Hill
- K.5411/36/1/3: Veld: determination of the optimum grazing capacity for the Eastern mixed Karoo with different breeds and species of small stock. 1986. C.H. Donaldson
- K.5411/36/1/4: Veld: determination of optimum grazing capacity for the arid Karoo with Afrino sheep. 1987. C.H. Donaldson
- K.5411/36/2/1: Veld: determination of relative grazing value indices for the different plant ecological groups in the Eastern mixed Karoo. 1983. M. Vorster
- K.5411/36/2/2: Veld: determination of relative grazing value indices for the different plant ecological groups in the north-western Karoo. 1983. M. Vorster
- K.5411/36/2/3: Veld: determination of relative grazing value indices for the different plant ecological groups in the eastern Karoo mountain areas. 1983. M. Vorster
- K.5411/36/2/4: Veld: determination of relative grazing value indices for the different plant ecological groups in the Great Karoo. 1983. M. Vorster
- N.5411/36/1/1: Grazing capacities of the land types in the Colenso area. 1986. R.P. Simms
- T.5411/36/1/1: Veld: the biomass dynamics of the most important grass species on debushed and non-debushed *Combretum* veld pastures. 1981. G.T. Rootman

- T.5411/36/1/2: Veld: production potential and quality of debushed and non-debushed *Combretum* veld pastures. 1981. G.T. Rootman
- T.5411/36/1/3: Veld: experimental cattle ranch on veld pastures in the bushveld at Soutpan. 1964. G. Marincowitz
- T.5411/36/1/4: Veld: the influence of different bush densities on grass production and grass species composition in the Mopani sandveld of the far northern Transvaal. 1988. G.N. Smit
- T.5411/36/1/5: Veld: the influence of different bush densities on grass production and grass species composition in the Mixed bushveld of Ellisras. 1988. G.N. Smit
- T.5411/36/1/6: Veld: the influence of different intensities of bush clearing on *Colophospermum mopane* in the Mopani sandveld of the far northern Transvaal. 1989. J.S. Swart
- T.5411/36/1/10: Veld: monitoring of soil water around *Dichrostachys cinerea* trees in the Sourish mixed bushveld. 1990. A. van Z. Brönn
- T.5411/36/2/1: Veld: observation of selection patterns of grazing animals on veld pastures in the south-eastern Transvaal. 1971. G.D. Kotze
- T.5411/36/2/2: Veld: an oesophageal fistula sample investigation of plant species selection on veld pastures in the south-eastern Transvaal. 1971. G.D. Kotze
- V.5411/36/1/1: Veld: the determination of norms to determine the carrying capacity of the veld at Armoedsvlakte. 1977. I.S. Venter
- V.5411/36/1/2: Veld: determination of norms to determine the carrying capacity of veld with cattle and sheep at Glen. 1985. I.S. Venter
- V.5411/36/1/3: Veld: monitoring of influence of game on veld in the Spitskop Nature Reserve at Upington. 1983. I.S. Venter
- V.5411/36/1/4: Veld: the monitoring of the effect of game on veld in the Leon Taljaard Reserve at Vryburg. 1983. I.S. Venter
- V.5411/36/1/5: Veld: the determination of norms for the estimation of the carrying capacity of *Tarchonanthus* veld for Dorper sheep at Koopmansfontein. 1985. I.S. Venter
- V.5411/36/1/6: Veld: an investigation of the production of veld invaded by *Acacia karroo* when utilised by Boer goats. 1983. L. Viljoen
- V.5411/36/1/7: Veld: determination of grazing capacity and veld condition benchmarks of the main veld ecotopes in the central grassveld areas of the Free State Region. 1985. H.J. Fouche
- V.5411/36/1/8: Veld: the determination of grazing capacity and veld condition benchmarks of the main veld ecotopes in the bushveld areas of the Free State Region. 1985. H.J. Fouche
- V.5411/36/1/9: Veld: the determination of grazing capacity and veld condition benchmarks of the main veld ecotopes in the Karoo and arid areas of the Free State Region. 1985. H.J. Fouche

• *Management/Bestuur*

- D.5411/41/1/2: Veld: the effect of intensity of defoliation on animal performance. 1981. J.E. Danckwerts
- D.5411/41/1/3: Veld: selection and composition rates of *A. karroo* communities by goats on a function stocking pressure. 1984. W.R. Teague
- D.5411/41/1/4: Veld: the effect of post-burn grazing practices on animal performance and veld characteristics in the Dohne sourveld. 1988. J.E. Danckwerts
- D.5411/41/1/5: Veld: the effect of season of burning on Dohne sourveld. 1988. J.E. Danckwerts
- D.5411/41/1/6: Veld: a critical test of currently recommended grazing practices in the false thornveld of the Eastern Cape Region. 1989. J.E. Danckwerts
- K.5411/41/1/1: Veld: determination of animal ratio in the noorsveld based on diet selection by Angora goats, Boer goats, Dorper and Merino sheep. 1984. P. Botha

- K.5411/41/1/2: Veld: determination of animal ratio on a Mixed Karoo bushveld in the north-western Karoo based on the selection by Afrino, Dorper and Merino sheep and Angora goats. 1984. P. Botha
- N.5411/41/1/1: Veld: burning and mowing in bioclimate 4e at Thabamhlope. 1944. B.D. Mappedoram
- N.5411/41/1/2: Regrowth rates of veld burnt at various times in spring. 1981. P.C.V. du Toit
- N.5411/41/1/4: Evaluation of veld potential with beef animals at Kokstad. 1979. M.B. Hardy
- N.5411/41/1/5: Veld: the determination of grazing capacity limits for different veld types in different veld condition classes within each veld type in the Natal Region. 1986. P.C.V. du Toit
- N.5411/41/1/6: Veld: benchmark evaluation per RHFA for veld types, veld condition assessment and animal production for the determination of grazing capacity in Natal. 1985. P.C.V. du Toit
- N.5411/41/1/7: Veld burning in Natal - interaction between burning and spring grazing. 1960. P.C.V. du Toit
- N.5411/41/1/11: Veld: relationship between veld condition score and long-term stocking rates applied to some grasslands in Natal. 1987. C.R. Hurt
- T.5411/41/1/1: Veld: continuous and fixed seasonal rotational grazing systems for veld pastures in the bushveld. 1935. G.T. Rootman
- T.5411/41/1/2: Veld: selection of trees, shrubs, forbs and grasses by Boer goats in the Mopani bushveld. 1985. C.J.F. Lüdemann
- T.5411/41/1/4: Production potential of key grass species in the Sourish mixed bushveld. 1986. J.J. Jordaan
- T.5411/41/1/5: The influence of continuous grazing and fixed seasonal rotational grazing systems with steers on the woody component of the Sourish mixed bushveld. 1986. G.N. Smit
- T.5411/41/1/6: Veld: effect of varying the period of rest before grazing spring-burned sourveld on veld condition and sheep performance. 1987. D.L. Barnes
- T.5411/41/1/7: Veld: seasonal shoot-growth patterns and changes in non-structural carbohydrate reserves of *Themeda triandra* under various defoliation schedules. 1987. Amanda Vermeulen
- T.5411/41/1/8: Veld: seasonal shoot-growth pattern and changes in the non-structural carbohydrate reserves of *Eragrostis curvula* under various defoliation schedules. 1988. A.C. Vermeulen
- T.5411/41/1/9: Veld: the influence of burning, chemical bush control Boer goats and cattle on the woody and herbaceous layer in the Sourish mixed bushveld. 1990. J.J. Jordaan
- T.5411/41/1/10: Veld: the identification and production of preferred tree shrub, herb and grass species of Boer goats in the Sourish mixed bushveld. 1990. J.J. Jordaan
- T.5411/41/1/11: Veld: common grasses of the northern Transvaal. 1989. J.J. Jordaan
- T.5411/41/1/12: Veld: effect of different times of burning in late winter and spring on the grass growth. 1990. K.J. Bloem
- T.5411/41/1/13: Veld: the residual effect of grazing on the dry matter production of *Themeda triandra* and associated grass species. 1990. Amanda C. Moore
- T.5411/41/2/1: Veld: influence of winter defoliation on the grass sward of sourveld pastures of south-eastern Transvaal. 1968. B.H. Beukes
- T.5411/41/2/2: Veld: development of a veld utilisation system with the elimination of untimely burns for the extensive grassveld pasture of south-eastern Transvaal. 1969. G.D. Kotze
- T.5411/41/2/3: Veld: development of a practically acceptable stock farming system on veld pastures for the semi-extensive area of south-eastern Transvaal. 1971. D.L. Barnes

- W.5411/41/1/1: Veld: the effect of grazing by small stock and cattle on the cover and composition of Strandveld. 1972. S.A. Barnard
- W.5411/41/1/2: Veld: the effect of seasonal defoliation on reserves and dry matter production of veld, Karoo bushes and grasses in the Winter Rainfall Region. 1977. S.A. Barnard
- W.5411/41/1/3: Veld: the evaluation and seed multiplication of natural pasture species at Worcester Veld Reserve. 1977. S.A. Barnard
- W.5411/41/1/4: Veld: nursery - Nortier Experiment Station. 1979. S.A. Barnard
- W.5411/41/1/5: Influence of different management systems on veld composition and animal production in the Strandveld of the Winter Rainfall Region. 1987. S.A. Barnard
- W.5411/41/1/6: Shoot apex development of *Stipagrostis brevifolia* and the influence of defoliation intensity on it under glasshouse conditions. 1986. S.A. Barnard
- W.5411/41/1/7: Veld: the influence of intensity and frequency of defoliation on the regrowth of *Stipagrostis brevifolia* under glasshouse conditions. 1987. S.A. Barnard
- W.5411/41/1/8: Veld: the influence of harvest date and different nitrogen fertilisation rates on seed production and viability of adapted indigenous pasture species in the Winter Rainfall Region. 1986. C.L. Burger
- W.5411/41/1/9: Veld: determination of the viability, dormancy, germination requirements and longevity of seed of adapted pasture species in the Winter Rainfall Region. 1986. C.L. Burger

• *Modelling/Modellerings*

- N.5411/42/1/2: The development and refinement of models to predict veld production. 1984. M.B. Hardy
- N.5411/42/1/3: Veld: a computer model simulating the species composition and tuft size variation in grassveld. 1987. M.B. Hardy

• *Technology/Tegnologie*

- K.5411/52/1/1: Veld: the development of a technique to measure the utilisation of Karoo bushes. 1985. C.H. Donaldson
- K.5411/52/1/2: Veld: evaluation of the descending point method of botanical survey as a technique to monitor utilisation of Karoo vegetation. 1985. C.H. Donaldson

RADICAL VELD IMPROVEMENT/RADIKALE VELDVERBETERING

• *Crop science/Gewaskunde*

- T.5412/30/1/1: Radical veld improvement: introduction of rhizomatous grasses into the sourveld of south-eastern Transvaal. 1968. B.H. Beukes
- T.5412/30/1/3: Radical veld improvement: introductions of kikuyu in the veld of the south-eastern Transvaal. 1972. G.D. Kotze

• *Potential studies/Potensiaalstudies*

- T.5412/36/1/1: Radical veld improvement: comparison of subtropical legume (*Vigna vexillata*) reinforced veld with natural veld for autumn grazing by sheep. 1973. G.D. Kotze

• *Management/Bestuur*

- W.5412/41/1/1: The evaluation of *Chrysanthemoides*, *Medicago* and *Atriplex* species for radical veld improvement in the sandveld of the Strandveld. 1978. S.A. Barnard

- W.5412/41/1/2: The evaluation and seed multiplication of natural pasture species at the Oudtshoorn Experiment Farm for planting in the Klein Karoo subregion. 1985. S.A. Barnard
- W.5412/41/1/3: Radical veld improvement: evaluation of adapted indigenous and exotic pasture species for veld improvement in the Karoo and arid areas of the Winter Rainfall Region. 1986. S.A. Barnard
- W.5412/41/1/4: Radical veld improvement through the sowing and planting of adapted pasture species in the duneveld farming area of the Winter Rainfall Region. 1986. S.A. Barnard

CULTIVATED PASTURE/AANGEPLANTE WEIDING

• *Physiology/Fisiologie*

- N.5413/03/1/1: Elucidation of growth control mechanisms which exist in the root meristem. 1989. R.J. Bennet

• *Nutrition/Voeding*

- D.5413/05/1/1: Cultivated pasture: the yield of Rhodes grass at various nitrogen and phosphate levels at Bathurst. 1981. C.J.G. le Roux
- D.5413/05/1/2: Cultivated pasture: the yield of Coastcross II at various nitrogen and phosphate levels at Bathurst. 1983. C.J.G. le Roux
- D.5413/05/1/3: Cultivated pasture: the yield of *Eragrostis curvula* at various nitrogen and potassium levels at Dohne. 1985. L.G. Howe
- N.5413/05/1/3: Effect of various levels of N, P and K on the productivity of Coastcross II pastures. 1974. P.E. Bartholomew
- N.5413/05/1/4: Phosphorus and potash requirements of *Eragrostis curvula* pastures on Leksand soils. 1974. P.E. Bartholomew
- N.5413/05/1/5: N, P, K and lime for *Eragrostis curvula* pastures. 1974. P.E. Bartholomew
- N.5413/05/1/7: Nutritional requirements of established kikuyu pastures: response to top-dressing. 1981. N. Miles
- N.5413/05/1/9: Reaction of kikuyu pastures to P, Ca, Mg and K on highly leached soils. 1982. N. Miles
- N.5413/05/1/12: Response of Midmar Italian rye grass pasture to N, P and K fertilisation. 1985. N. Miles
- N.5413/05/1/13: The effect of nitrogen fertilisers on the chemical composition and dry matter production of Midmar Italian rye grass pastures. 1985. R.J. Eckard
- N.5413/05/1/14: Cultivated pasture: nutrition - pasture response to liquid forms of nitrogen and phosphate fertiliser. 1989. R.J. Eckard
- T.5413/05/1/1: Cultivated pasture: distribution of phosphatic fertiliser on *Eragrostis curvula* in the Drakensberg grazing region. 1971. B.H. Beukes
- T.5413/05/1/3: Cultivated pasture: phosphate fertilisation of *Eragrostis curvula* in the Drakensberg grazing area. 1969. C.C. de Witt
- T.5413/05/1/4: Cultivated pasture: influence of level and distribution of nitrogenous fertiliser on the production and composition of kikuyu throughout the year. 1974. C.C. de Witt
- V.5413/05/1/2: Cultivated pasture: determination of nutrient requirements of *Sporobolus fimbriatus* by means of pot experiments at Glen. 1981. L.G. du Pisani
- W.5413/05/1/1: Determination of the phosphorus requirements of annual mediterranean pasture legumes in the Ruens area. 1976. J.D. Langenhoven
- W.5413/05/1/2: A study of the nitrogen fertiliser requirements of pastures in the irrigation areas of George. 1979. J.D. Langenhoven

• *Upgrading/Veredeling*

- N.5413/07/1/1: Cultivated pasture: breeding and selection of *Paspalum dilatatum*. 1959. A. Smith
- N.5413/07/1/2: Cultivated pasture: breeding and selection of *Dactylis glomerata*. 1959. D.C.W. Goodenough
- N.5413/07/1/3: Cultivated pasture: breeding and selection of *Lolium multiflorum*. 1959. D.C.W. Goodenough
- N.5413/07/1/4: Cultivated pasture: breeding and selection of *Eragrostis curvula*. 1970. D.C.W. Goodenough
- N.5413/07/1/5: Cultivated pasture: breeding and selection of *Acroceras macrum*. 1979. A. Smith
- N.5413/07/1/6: Cultivated pasture: breeding and selection of *Digitaria eriantha*. 1974. G.F. Watt-Pringle
- N.5413/07/1/7: Cultivated pasture: breeding and selection of *Trifolium* spp. 1977. A. Smith
- N.5413/07/1/8: Cultivated pasture: breeding and selection of *Festuca arundinacea*. 1978. A. Smith
- N.5413/07/1/9: Cultivated pasture: breeding and selection of *Lolium perenne*. 1978. A. Smith
- N.5413/07/1/10: Cultivated pasture: *Lolium multiflorum* cultivars for improved autumn, winter and summer growth. 1982. G.F. Watt-Pringle
- N.5413/07/2/1: Tissue and anther culture in white clover. 1981. G.F. Watt-Pringle
- N.5413/07/3/1: Cultivated pasture: breeder seed production and monitoring of commercial seed of Cedara-bred cultivars. 1983. A.R.J. Morrison

• *Nitrogen fixation/Stikstofbinding*

- N.5413/09/1/1: Cultivated pasture: selection of *Rhizobium* strains for *Trifolium*. 1967. A. Smith

• *Pathology/Patologie*

- N.5413/19/1/1: Cultivated pasture: pathological survey of *P. clandestinum*, *E. curvula* and *L. multiflorum*. 1983. A.S. Hall
- N.5413/19/1/2: Cultivated pasture: fungicidal control of *Drechslera* spp. on *Pennisetum clandestinum*. 1985. A.S. Hall
- N.5413/19/1/3: Cultivated pasture: fungicidal control of *Drechslera* and *Puccinia* on *Lolium* spp. 1985. A.S. Hall
- N.5413/19/1/4: Cultivated pasture: the effect of seed treatments on *Lolium multiflorum* herbage yields. 1985. A.S. Hall

• *Pests/Plae*

- W.5413/20/1/1: Control of the lucerne springtail *Smithurus viridis* (L.) and the black sandmite *Halotydeus destructor* (Tucker) in the winter rain cropping area. 1960. J. Lombaard
- W.5413/20/2/1: Cultivated pasture: survival studies on *Anguina agrostis*, the nematode involved in rye grass poisoning in the Winter Rainfall Region. 1987. A.J. Meyer

• *Chemical control/Chemiese beheer*

- D.5413/21/1/1: Cultivated pasture: screening pasture plants for tolerance to Tetrapion. 1983. C.J.G. le Roux
- D.5413/21/1/2: Cultivated pasture: preliminary assessment of herbicides for use in legume pasture in the High rainfall sourveld areas of the Eastern Cape. 1984. L.G. Howe

- W.5413/21/1/1: Cultivated pasture: chemical weed control in cultivated legume pastures under dryland cultivation in high potential areas of the Winter Rainfall Region. 1979. D.J. le Roux
- W.5413/21/1/2: Cultivated pasture: the influence of chemical control of grass and broad-leaf weeds on the carrying capacity of dryland legume pasture. 1985. D.J. le Roux
- W.5413/21/1/3: Cultivated pasture: weed control in a wheat/medic pasture rotational system in the Swartland. 1985. D.J. le Roux
- W.5413/21/1/4: Cultivated pasture: weed control in a wheat/medic pasture rotational system in the Ruens. 1985. D.J. le Roux
- W.5413/21/1/5: Cultivated pasture: grass and broad-leaf weed control in a medic/wheat rotational system in the Swartland. 1988. D.J. le Roux

• *Crop science/Gewaskunde*

- D.5413/30/1/1: Cultivated pasture: maintenance and development of the pasture nursery at Bathurst. 1976. C.J.G. le Roux
- D.5413/30/1/2: Cultivated pasture: maintenance and development of the pasture nursery at Dohne. 1976. C.J.G. le Roux
- D.5413/30/1/5: Cultivated pasture: maintenance and management of a pasture nursery at Whitney. 1986. J.S. Swart
- H.5413/30/1/5: Cultivated pasture: the value of seven perennial grasses on three marginal cropping soils. 1985. C.J. Haefele
- H.5413/30/1/7: Cultivated pasture: the influence of resting period during the growing season on the potential of four perennial tropical grasses as foggage. 1987. C.S. Dannhauser
- H.5413/30/2/1: Cultivated pasture: the evaluation of Smuts finger grass in combination with lucerne as pasture. 1981. R.H. Drewes
- N.5413/30/1/1: Preliminary evaluation of the pasture plant material centre in the Tall grassveld. 1972. B.D. Mappledoram
- N.5413/30/1/2: Evaluation of pasture plants in Natal. 1970. B.D. Mappledoram
- N.5413/30/3/1: Cultivated pasture: legumes suitable for kikuyu pastures. 1978. C.I. MacDonald
- N.5413/30/3/2: Cultivated pasture: management of red clover in kikuyu pasture. 1981. C.I. MacDonald
- N.5413/30/4/1: Cultivated pasture: *Lolium multiflorum* seed production. 1981. D.C.W. Goodenough
- N.5413/30/4/2: Cultivated pasture: *Trifolium repens* seed production. 1981. A. Smith
- N.5413/30/5/1: Cultivated pasture: herbage production trials for the selection of *Dactylis glomerata* pasture. 1977. B.D. Mappledoram
- N.5413/30/5/2: Cultivated pasture: herbage production trials for the selection of *Festuca arundinacea* pasture. 1978. B.D. Mappledoram
- N.5413/30/5/3: Cultivated pasture: *Eragrostis curvula* cultivar trials at Tabamhlope. 1968. B.D. Mappledoram
- N.5413/30/5/4: Cultivated pasture: seasonal yield and quality of pastures. 1972. B.D. Mappledoram
- N.5413/30/5/8: *Cynodon* cultivar with grazing (phase II) on Estcourt soil in Bioclimate 8. 1977. B.D. Mappledoram
- N.5413/30/5/9: *Cynodon* cultivar trial with grazing (phase II) on an Avalon soil in Bioclimate 8. 1977. B.D. Mappledoram
- N.5413/30/5/10: *Cynodon* cultivar trial with grazing (phase II) on an Uitvlugt soil in Bioclimates. 1977. B.D. Mappledoram
- N.5413/30/5/11: *Trifolium pratense* cultivar trial in Bioclimate 4e. 1978. B.D. Mappledoram

- N.5413/30/5/12: Classification, processing and assessment of available data of cultivated pasture species. 1976. E.N. Boeke
- N.5413/30/5/13: Cultivated pasture: foggage value of cultivated pastures in the Natal midlands. 1977. P.C.V. du Toit
- N.5413/30/5/14: Cultivated pasture: foggage value of pastures at Kokstad. 1981. N.N. Gray
- N.5413/30/5/15: Cultivated pasture: temperate pastures under irrigation in bioclimate 4e. 1980. T.M. du Plessis
- N.5413/30/5/16: Cultivated pasture: effect of different sites on the production of various pasture species in bioclimate 3. 1980. G.F. Watt-Pringle
- N.5413/30/5/17: Cultivated pasture: determination of the water use efficiency (WUE) of *Lolium multiflorum* under irrigation. 1986. E.N. Boeke
- N.5413/30/5/18: Cultivated pasture: determination of the water use efficiency (WUE) of *Eragrostis curvula* on dryland and under irrigation. 1986. E.N. Boeke
- N.5413/30/7/1: Cultivated pasture: growth and development of kikuyu pastures. 1981. P.C.V. du Toit
- T.5413/30/1/1: Cultivated pasture: height and stage of cutting of *Eragrostis curvula* in the Drakensberg grazing region. 1969. B.H. Beukes
- T.5413/30/1/2: Cultivated pasture: influence of burning nitrogen and height of cutting on the seed production of *Eragrostis curvula* in the Drakensberg grazing region. 1973. G.D. Kotze
- T.5413/30/2/1: Cultivated pasture: seed multiplication of tropical and subtropical pasture mixtures, legumes and grasses. 1975. G.D. Kotze
- V.5413/30/1/1: Cultivated pasture: phase-1 evaluation of pasture plants at Armoedsvlakte. 1974. L.G. du Pisani
- V.5413/30/1/2: Cultivated pasture: phase-1 evaluation of pasture plants at Glen. 1971. L.G. du Pisani

• *Potential studies/Potensiaalstudies*

- T.5413/36/1/1: Cultivated pasture: dry matter production and nutritional value of stoloniferous *Digitaria* introductions. 1975. G.T. Rootman
- T.5413/36/1/2: Cultivated pasture: dry matter production and nutritional value of *Panicum maximum* introductions. 1975. G.T. Rootman
- T.5413/36/1/3: Cultivated pasture: performance of *Cenchrus ciliaris* as a summer pasture in the bushveld. 1972. G.T. Rootman
- T.5413/36/2/1: Cultivated pasture: the influence of level of fertilisation and harvest stage on the feeding value of *Eragrostis curvula* in the Drakensberg grazing region. 1976. L. Bouwer
- T.5413/36/2/2: Cultivated pasture: determination of the production potential of grasses for irrigated pastures in the south-eastern Transvaal. 1973. B.H. Beukes
- T.5413/36/2/3: Cultivated pasture: evaluation of legumes in association with *Eragrostis curvula* in south-eastern Transvaal. 1973. C.C. de Witt
- T.5413/36/2/4: Cultivated pasture: evaluation of perennial grasses under dryland conditions for incorporation in livestock production systems in south-eastern Transvaal. 1973. C.C. de Witt
- T.5413/36/2/5: Cultivated pasture: evaluation of legumes in a kikuyu pasture mixture. 1973. C.C. de Witt
- T.5413/36/2/6: Cultivated pasture: the potential of *Digitaria eriantha* and a mixture of *D. eriantha* and *Medicago sativa* for woolled sheep. 1984. C.C. de Witt
- T.5413/36/2/7: Cultivated pasture: influence of the length of the pre-winter resting period on the feeding value of kikuyu in winter. 1974. C.C. de Witt
- T.5413/36/2/8: Cultivated pasture: the evaluation of a mixture of irrigated Midmar rye grass and arrow leaf clover in terms of slaughter lamb production. 1985. A. Moore

- T.5413/36/2/9: Cultivated pasture: phase-two evaluation of ten cold-tolerant ecotypes of *Panicum maximum* Jacq. 1985. A. Moore
- T.5413/36/2/10: Cultivated pasture: the use of lucerne/maize rotation as a basis for integration of the animal factor in maize production. 1987. A. Moore
- T.5413/36/2/11: Cultivated pasture: grazing capacity and quality of kikuyu foggage after varying periods of rest in the growing season. 1987. D.L. Barnes
- T.5413/36/2/14: Cultivated pastures: the reaction of kikuyu and Smuts finger grass pastures under grazing with sheep on N P or K and lime application. 1989. C.C. de Witt
- T.5413/36/2/15: Cultivated pastures: the effect of four irrigation schedules on the dry matter yields of various pasture species. 1990. K.P. Kirkman
- T.5413/36/2/16: Cultivated pastures: the effect of different defoliation treatments in late winter and spring on the subsequent production of *Eragrostis curvula*. 1990. K.J. Bloem
- T.5413/36/2/17: Cultivated pastures: the development of an intensive fat lamb production system in the High rainfall sourveld of the south-eastern Transvaal. 1990. K.P. Kirkman
- V.5413/36/1/2: Cultivated pasture: phase-I evaluation of animal rye grass cultivars under sprinkler irrigation at Glen. 1990. L.G. du Pisani
- V.5413/36/1/3: Cultivated pasture: an investigation on the finishing of cattle on *Cenchrus ciliaris* pastures at Glen. 1984. L.G. du Pisani
- V.5413/36/1/6: Cultivated pasture: an ecotype evaluation of *Antheophora pubescens* at two fertilisation levels on a soil of the Sunbury series at Vergeleë. 1976. E.A.N. Engels
- V.5413/36/1/7: Cultivated pasture: an investigation on the finishing of cattle on *Antheophora pubescens* at Armoedsvlakte. 1988. L.G. du Pisani

• *Conservation studies/Bewaringstudies*

- N.5413/38/1/1: Making silage from Italian rye grass pastures. 1983. P.C.V. du Toit

• *Management/Bestuur*

- D.5413/41/1/2: Cultivated pasture: potential of temperate grasses in the eastern coastal areas of the Eastern Cape Region. 1976. C.J.G. le Roux
- D.5413/41/1/4: Cultivated pasture: screening of annual legumes in the eastern coastal areas of the Eastern Cape Region. 1980. C.J.G. le Roux
- D.5413/41/1/6: Cultivated pasture: evaluation of Coastcross II for beef production in the eastern seaboard areas of the Eastern Cape. 1983. C.J.G. le Roux
- D.5413/41/1/7: Cultivated pasture: the influence of pasture availability, structure and maturity of kikuyu on the grazing behaviour and production of dairy cows in the eastern seaboard areas of the Eastern Cape. 1983. C.J.G. le Roux
- D.5413/41/1/8: Cultivated pasture: screening of perennial legumes for the eastern seaboard areas of the Eastern Cape. 1984. C.J.G. le Roux
- D.5413/41/1/9: Cultivated pasture: growth patterns of summer grasses at Dohne. 1979. C.J.G. le Roux
- D.5413/41/1/10: Cultivated pasture: potential of temperate grasses at Dohne. 1979. C.J.G. le Roux
- D.5413/41/1/11: Cultivated pasture: screening of annual and temperate legumes at Dohne. 1980. C.J.G. le Roux
- D.5413/41/1/13: Cultivated pasture: screening of legumes in the eastern coastal areas of the Eastern Cape Region. 1980. C.J.G. le Roux
- D.5413/41/1/15: Cultivated pasture: the yield of lucerne, crown vetch and glycine when cropped by sheep at three intensities and three frequencies. 1987. C.J.G. le Roux
- D.5413/41/1/17: Cultivated pasture: to test the hypothesis that grazing vetch is more profitable than oats as a winter-green annual pasture for ewes and lambs in the Eastern Cape sourveld. 1987. T.G. Coetzee

- D.5413/41/1/18: Cultivated pasture: the evaluation of standing glycine hay for the production of autumn lambs. 1989. C.J.G. le Roux
- D.5413/41/2/1: Cultivated pasture: species to replace nassella at Cathcart. 1978. C.J.G. le Roux
- N.5413/41/1/1: Cultivated pasture: strip replacement of Ngongoni veld with pasture species. 1979. C.I. MacDonald
- N.5413/41/1/2: Evaluation of *Cynodon dactylon* cultivar K11 in the eastern grassveld by grazing. 1974. P.C.V du Toit
- N.5413/41/1/4: Cultivated pasture: *Festuca arundinacea* pasture with and without legumes at the stocking rates in bioclimate 3. 1981. C.I. McDonald
- N.5413/41/1/6: Cultivated pasture: steers on various pastures in bioclimate 4e. 1973. B.D. Mappledoram
- N.5413/41/1/7: Cultivated pasture: cows and calves on various pastures in bioclimate 4e. 1972. B.D. Mappledoram
- N.5413/41/1/8: Cultivated pasture: steers on star grass pasture at the stocking rates in bioclimate 6. 1979. B.D. Mappledoram
- N.5413/41/1/9: Cultivated pasture: effect of stocking rate on the performance of weaners on irrigated *Lolium multiflorum* pastures in bioclimate 3. 1981. P.E. Bartholomew
- N.5413/41/1/10: Cultivated pasture: effect of stocking rate and nitrogen fertiliser on the performance of steers on *Digitaria eriantha* and *Eragrostis curvula*/legume pastures in bioclimate 4f. 1982. M.B. Hardy
- N.5413/41/1/11: Cultivated pasture: effect of stocking rate and nitrogen fertiliser on the performance of wethers on various pastures on upland and bottomland sites in bioclimate 4f. 1974. M.B. Hardy
- N.5413/41/1/12: Cultivated pasture: fertilisation of old land pastures under grazing in bioclimate 8. 1980. P.C.V. du Toit
- N.5413/41/1/13: Cultivated pasture: characterisation of various pasture species under different management systems and stocking rates. 1980. P.E. Bartholomew
- N.5413/41/1/15: Cultivated pasture: effect of stocking rate on the performance of ewes plus lambs on Italian rye grass/clover pasture and weaned lambs on perennial rye grass/clover pasture. 1987. P.E. Bartholomew
- T.5413/41/1/1: Cultivated pasture: optimal utilisation of *Eragrostis curvula* grazing with beef cattle in the south-eastern Transvaal. 1974. B.H. Beukes
- T.5413/41/1/2: Cultivated pasture: development of a practical acceptable beef/sheep farming system based on planted grasses. 1972. A. Moore
- T.5413/41/1/3: Cultivated pasture: evaluation of *Eragrostis curvula* for intensive sheep production in south-eastern Transvaal. 1972. B.H. Beukes
- T.5413/41/1/4: Cultivated pasture: optimisation of grazing management of *C. varia* in the summer rain cropping area of Transvaal Region. 1985. D.L. Barnes
- T.5413/41/2/2: Cultivated pasture: a comparison of grazing/fodder types and their combinations for animal production by means of slaughter lambs. 1984. D.F. de Wet
- T.5413/41/2/3: A comparison of grazing/fodder types and their combinations for animal production by means of mutton/wool ewes in different physiological stages. 1987. A.D. Venter
- V.5413/41/1/1: Cultivated pasture: a comparison of veld and veld in combination with cultivated pastures in terms of beef production at Armoedsvlakte. 1974. L.G. du Pisani
- W.5413/41/1/1: Evaluation of kikuyu as a pasture crop under irrigation in the Stellenbosch area. 1982. J.D. Langenhoven
- W.5413/41/1/2: The evaluation of pasture legumes and grasses under irrigation in the Winter Rainfall Region by means of cutting methods. 1979. J.M. van Heerden
- W.5413/41/1/4: The evaluation of grass/legume pastures under irrigation and dryland conditions and different grazing practices in the George area. 1983. J.M. van Heerden

- W.5413/41/1/5: Carrying capacity of artificial pasture/small grain rotation in the Ruens area. 1972. J.D. Langenhoven
- W.5413/41/1/6: Determination of the carrying capacity of dryland artificial grass/legume pastures at Tygerhoek in the Ruens area. 1979. J.M. van Heerden
- W.5413/41/1/7: Comparison of the carrying capacity of dryland pasture mixtures under different soil-climate conditions in the Ruens area. 1982. J.M. van Heerden
- W.5413/41/1/8: Determination of the optimum sowing time and sowing density for medics in the Swartland. 1981. J.D. Langenhoven
- W.5413/41/1/9: Investigation of new dryland cultivated pasture crops in the Swartland and Boland areas. 1973. J.D. Langenhoven
- W.5413/41/1/10: Investigation of new dryland cultivated pasture crops at Elsenburg and in the Ruens area. 1973. J.M. van Heerden
- W.5413/41/1/11: Investigation of dryland cultivated pasture crops for the eastern seaboard area of the Winter Rainfall Region by cutting methods. 1973. J.M. van Heerden
- W.5413/41/1/12: Investigation of new cultivated pasture crops for the Karoo and arid areas of the Winter Rainfall Region by cutting methods. 1973. J.D. Langenhoven
- W.5413/41/1/13: Cultivated pasture: the evaluation of sorghum cultivars and lines under irrigation in the Winter Rainfall Region. 1986. P.R. Botha
- W.5413/41/1/14: Cultivated pasture: determination of the carrying capacity of grass/clover pastures under irrigation in the Winter Rainfall Region under continual grazing and different nitrogen fertilisation levels. 1986. J.M. van Heerden
- W.5413/41/1/15: Investigation of the establishment and re-establishment of medic pastures in the wheat-medic crop rotation systems in the Winter Rainfall Region. 1990. T.N. Kotze

• *Modelling/Modellering*

- V.5413/42/1/1: Cultivated pasture: modelling the growth of *Cenchrus ciliaris* L, cv. Molopo and the growth performance of steers grazing it in summer. 1990. L.G. du Pisani

• *Chemistry/Chemie*

- N.5413/53/1/1: Cultivated pasture: to determine the correlation between in vitro digestion and animal production of pasture crops. 1978. J.P. Marais
- N.5413/53/1/3: Cultivated pasture: determination of factors influencing the preparation of high quality kikuyu silage. 1979. J.P. Marais
- N.5413/53/1/4: Cultivated pasture: determination of the effect of the nitrogen status of kikuyu grass upon digestibility. 1986. J.P. Marais

LUCERNE/LUSERN

• *Upgrading/Veredelings*

- K.5414/07/1/3: Lucerne: the National Lucerne Evaluation Programme. 1986. E. Sykes
- K.5414/07/1/4: Lucerne: the National Lucerne Evaluation Programme. 1986. J.H. Pretorius

• *Pests/Plae*

- V.5414/20/1/1: Lucerne: investigation on the occurrence and distribution of the white fringed beetle on lucerne in the Lower Orange River irrigation area. 1985. J. de Jager
- V.5414/20/1/2: Lucerne: evaluation of soil-applied insecticides for the control of white fringed beetle larvae on established lucerne at Upington. 1987. J. de Jager
- W.5414/20/1/1: The influence of grazing on aphid populations on different lucerne cultivars in the Winter Rainfall Region. 1985. J. Lombard

• *Chemical control/Chemiese beheer*

- W.5414/21/1/1: Lucerne: phytotoxicity and efficiency of the present and new weedicides in lucerne in the Oudtshoorn irrigation area. 1985. D.J. le Roux
- W.5414/21/1/2: Lucerne: pasture topping for the control of annual grasses in legume pastures in the Rûens area of the Winter Rainfall Region. 1988. D.J. le Roux

• *Crop science/Gewaskunde*

- D.5414/30/1/1: Evaluation of improved lucerne cultivars for the high rainfall sourveld areas of the Eastern Cape at Dohne. 1986. G.R. Barnes
- D.5414/30/1/2: Evaluation of improved lucerne cultivars for the eastern seaboard areas of the Eastern Cape at Bathurst. 1986. G.R. Barnes
- H.5414/30/1/1: Lucerne: the national lucerne evaluation programme. 1981. R.H. Drewes
- H.5414/30/2/1: Lucerne: the influence of frequency of defoliation on the production and quality of dryland lucerne. 1984. C.J. Haefele
- H.5414/30/3/1: Lucerne: the value of Pierce lucerne on three soil series as a dryland pasture for ewes and lambs in the Highveld Region. 1985. A.S. de Beer
- N.5414/30/1/1: Evaluation of new lucerne cultivars for agricultural value in various bioclimatic regions at Kokstad, Cedara and Dundee. 1986. A. Smith
- T.5414/30/1/1: Lucerne: cultivation of lucerne on different ecological units with different espacements and seeding rates. 1975. C.C. de Witt
- T.5414/30/1/2: Lucerne: the evaluation of new lucerne cultivars under grazing by sheep or with cutting in south-eastern Transvaal. 1988. A. Moore
- V.5414/30/1/1: Lucerne: an investigation of the adaptability of lucerne cultivars which are resistant to the blue-green aphid and pea aphid under irrigation at Upington. 1982. L.G. du Pisani
- V.5414/30/1/2: Lucerne: an investigation of the adaptability of lucerne cultivars resistant to the blue-green aphid and pea aphid under dryland conditions. 1984. L.G. du Pisani
- V.5414/30/1/3: Lucerne: an investigation of the adaptability of lucerne cultivars which are resistant to the blue-green aphid and pea aphid under irrigation at Vaalharts. 1982. L.G. du Pisani
- V.5414/30/2/1: Lucerne: to determine the optimal row spacings and seeding rates for lucerne under dryland conditions at Glen. 1983. L.G. du Pisani
- V.5414/30/2/2: Lucerne: the influence of the frequency of interrow cultivation on the production of dryland lucerne under cultivation at Glen. 1983. L.G. du Pisani
- W.5414/30/1/1: Adaption studies in the Winter Rainfall Region with lucerne cultivars and lines from the national lucerne evaluation programme. 1986. J.D. Langenhoven

• *Management/Bestuur*

- W.5414/41/1/1: Lucerne: an evaluation of the resistance to grazing of new lucerne cultivars under dryland conditions in the Ruens area. 1985. J.D. Langenhoven
- W.5414/41/2/1: Investigation on the influence of row width, plant density and frequency of hay cuttings on seed production of three lucerne cultivars. 1987. J.D. Langenhoven
- W.5414/41/2/3: Influence of grazing method on the grazing capacity and production of four lucerne cultivars under irrigation. 1990. W. Durand

ANNUAL FODDER CROPS/EENJARIGE VOERGEWASSE

• *Crop science/Gewaskunde*

- H.5415/30/1/1: Annual fodder crops: the influence of time of establishment on the production of annual winter fodder crops. 1977. R.H. Drewes

- H.5415/30/1/2: Annual fodder crops: the influence of fertilisation and cutting frequency on the production of five rye grasses with limited irrigation. 1985. A.S. de Beer
- *Potential studies/Potensiaalstudies*
- T.5415/36/1/1: Annual fodder crops: evaluation of *Pennisetum typhoides* as a fodder crop. 1977. G.T. Rootman
- *Management/Bestuur*
- K.5415/41/1/2: Annual fodder crops: optimum planting date of annual small grain and *Medicago* species. 1987. C.H. Donaldson
- K.5415/41/1/3: Annual fodder crops: the performance of small stock at different stocking rates on pastures under irrigation. 1988. C.H. Donaldson
- W.5415/41/1/1: Evaluation of annual fodder legume crops. 1979. J.D. Langenhoven

DROUGHT FODDER CROPS/DROOGTE-VOERGEWASSE

- *Physiology/Fisiologie*
- W.5416/03/1/1: Drought fodder crops: influence of season, genotype and soil type on the palatability and chemical composition of *Atriplex nummularia* in the Winter Rainfall Region. 1987. S.A. Barnard
- *Upgrading/Veredeling*
- K.5416/07/1/1: Drought fodder crops: collection and evaluation of plants as drought fodder crops. 1964. G.C. de Kock
- *Management/Bestuur*
- K.5416/41/1/1: Drought fodder crops: the use of *Atriplex nummularia* to lessen the effects of grazing of veld. 1988. C.H. Donaldson
- K.5416/41/1/2: Drought fodder crops: the influence of frequency of defoliation on the ability of *Atriplex nummularia* (Old man saltbush) to recover. 1988. C.H. Donaldson
- K.5416/41/1/3: Annual fodder crops: the performance of small stock at different stocking rates on pastures under irrigation. 1988. C.H. Donaldson

LEGUME FODDER CROPS/VOERPEULGEWASSE

- *Crop science/Gewaskunde*
- T.5417/30/1/1: Legume fodder crops: determination of inoculation requirements of pasture and fodder legumes. 1977. A.J. Kruger
- T.5417/30/1/2: Legume fodder crops: determination of daylength and temperature requirements for normal flowering in specific pasture and fodder legumes. 1977. A.J. Kruger
- T.5417/30/1/3: Legume fodder crops: screening of pasture legumes for soil acidity tolerance. 1977. A.J. Kruger
- T.5417/30/1/4: Legume fodder crops: a study of the effects of N fertilisation on the productivity of a white clover grass pasture. 1981. A.J. Kruger
- T.5417/30/1/5: Legume fodder crops: a system in which maize is relay intercropped with annual temperate pasture legumes with a view to improving winter grazing. 1983. A.J. Kruger

- T.5417/30/1/7: Legume fodder crops: the effect of babala (*Pennisetum americanum*) as support crop, nitrogenous fertiliser and seed rate on the growth and production of dolichos bean (*Lablab purpureus*). 1983. A.J. Kruger
- T.5417/30/1/8: Legume fodder crops: a study of the use of maize as a cover crop for the establishment of *Coronilla varia* and *Lotus corniculatus*. 1983. D.L. Barnes
- T.5417/30/2/1: Legume fodder crops: nursery trials with pasture and fodder legumes. 1978. A.J. Kruger
- T.5417/30/2/2: Legume fodder crops: yield studies with tropical and subtropical pasture and fodder legumes at Rietondale. 1978. A.J. Kruger
- T.5417/30/2/3: Legume fodder crops: yield trials with temperate legumes. 1978. A.J. Kruger
- T.5417/30/2/4: Legume fodder crops: calibration of Neotec 4250 near infra-red forage analyser for the complete analysis of forage and pasture samples. 1985. M.A. Stoltz

Veld

BUSHVELD/BOSVELD

• Ecology/Ekologie

- NW.5421/27/1/1: Game ranching decision support in respect of stocking rates and species. 1988. D.D. Berliner
- NW.5421/27/1/2: Management guidelines for the Doornpoort Experiment game farm. 1989. D.C. Smith
- NW.5421/27/1/3: A situational analysis regarding the game industry on private property in the most important game farm areas of the Transvaal and Eastern Cape Region. 1989. J.C. Pauw
- NW.5421/27/1/4: The development of TV programmes and a set of pamphlets on game ranch management. 1988. J.C. Pauw
- NW.5421/27/1/5: Reducing intertree competition through selective thinning and herbicide treatment to alleviate bush encroachment. 1990. R.J. Davies
- NW.5421/27/2/1: Forage production of the three most abundant grass species on the Roodeplaat Research Centre. 1989. Y. Ford
- NW.5421/27/2/2: Tuber dynamics of *Setaria scphacelia* var. *serecia* (staff Clayton). 1989. Y. Ford

Cultivated pasture/Aangeplante weiding

LEGUMES/PEULPLANTE

• Crop science/Gewaskunde

- NW.5431/30/1/1: Establishment practices for annual and perennial cultivar of *Cajanus cajan*. 1987. C. Sutherland
- NW.5431/30/1/2: Establishment practices for *Macroptilium lathyroides* cv. Murray an annual pasture and fodder crop. 1988. C.M. Sutherland
- NW.5431/30/1/3: The influence of seeding method and seed density on the dry matter production and quality of *Ornithopus compressus* (Serradella) cv. Pitman. 1989. C.M. Sutherland

GRASSES/GRASSE

• Nutrition/Voeding

- NW.5432/05/1/1: The characterisation of eight *Pennisetum* cultivars in terms of dry matter production and quality. 1989. M.J. Kleyn

- *Upgrading/ Veredeling*

- NW.5432/07/1/1: Introduction and description of *Digitaria eriantha*. 1989. C.J. Terblanche
- NW.5432/07/1/2: The selection of potential parents in the improvement of *Digitaria eriantha*. 1989. C.J. Terblanche

MIXTURES/MENGSELS

- *Nutrition/ Voeding*

- NW.5433/05/1/1: Development of a databank for quality parameters of pasture and fodder crops. 1988. M.J. Kleyn

- *Crop science/ Gewaskunde*

- NW.5433/30/1/1: The interaction between *Trifolium resupinatum* and *Lolium multiflorum* var. *Westerwoldicum* in mixed cultivation. 1988. M. van den Berg
- NW.5433/30/1/2: Light and carbon dioxide competition and carbon fixation of clover and rye grass in a mixed pasture. 1989. L.J. Muller
- NW.5433/30/1/3: The influence of seeding method on the production of *Trifolium resupinatum* and *Lolium multiflorum* var. *Westerwoldicum* in mixed cropping. 1989. M. van der Berg

- *Management/ Bestuur*

- NW.5433/41/1/1: The intake, digestion and utilisation by sheep of pure swards of annual temperate grasses and legumes in comparison with intercrops of these forages. 1988. D.V. Paulsmeier
- NW.5433/41/1/2: The measurement of production and nutritional value of pasture species and cultivars and different regimes of grazing and supplementation in South Africa. 1989. D.V. Paulsmeier

Fodder crops/Voergewasse

PERENNIAL/MEERJARIG

- *Pollination/ Bestuiwing*

- NW.5442/29/1/1: The ontogeny of *Tylosema esculentum*. 1989. H.M. de Frey

- *Crop science/ Gewaskunde*

- NW.5442/30/1/1: Introduction of plants with potential as alternate forages. 1988. A.J. Kruger
- NW.5442/30/2/1: Initial evaluation of forage accessions in South Africa. 1988. M.J. Erasmus
- NW.5442/30/2/2: Evaluation of promising accessions in terms of climatic adaptation production, chemical composition, survival and possible application. 1988. A.J. Kruger
- NW.5442/30/3/1: Development of practical seed harvesting techniques for promising forage accessions. 1988. H. Nel
- NW.5442/30/3/2: Development of seed processing techniques for promising forage accessions. 1988. H. Nel
- NW.5442/30/3/3: Development of a seed industry and initial marketing strategy for the Grassland Research Centre. 1988. H. Nel

RESOURCE UTILISATION RESEARCH (FARMING SYSTEMS) HULPBRONBENUTTINGSNAVORSING (BOERDERYSTELSELS)

Farming enterprises/Boerderyvertakings

STOCK AND GAME FARMING/VEE- EN WILDBOERDERY

• *Potential studies/Potensiaalstudies*

- D.5511/36/1/1: Stock and game farming: development of a viable stock farming system for the Valley bushveld in good condition in the Eastern Cape Region. 1983. J.E. Danckwerts
- D.5511/36/1/2: Stock and game farming: development of a viable stock farming system for the Valley bushveld in a poor condition in the Eastern Cape Region. 1983. J.E. Danckwerts
- D.5511/36/1/3: Stock and game farming: development of a viable stock farming system for the dry grass-bush communities of the Eastern Cape Region. 1976. J.E. Danckwerts
- D.5511/36/1/4: Stock and game farming: the development and management of an adapted stock farming system Campagna for the High rainfall sourveld. 1983. H.H. Barnard
- D.5511/36/1/5: Stock and game farming: development of a game production system for the Valley bushveld in the Eastern Cape Region. 1985. J.E. Danckwerts
- D.5511/36/2/1: Stock and game farming: the potential of cultivated pastures in terms of small stock. 1976. A.J. Fourie

• *Management/Bestuur*

- H.5511/41/1/1: Stock and game farming: the influence of different feeding strategies on the economic and biological efficiency of beef cattle farming. 1982. R.H. Drewes
- H.5511/41/2/1: Stock and game farming: the influence of different feeding strategies on the economic and biological efficiency of woolled sheep farming. 1985. B.G.J. van Vuuren

CROP FARMING/SAAIBOERDERY

• *Crop science/Gewaskunde*

- H.5512/30/1/1: Crop farming: the evaluation of a maize/groundnut system with plough and stubble mulch cultivation on a Zwartfontein serie in RHFA 6018 in the Highveld Region. 1988. P.J. Laubscher
- V.5512/30/1/1: Crop farming: evaluation of crop succession systems in which wheat and maize are grown under dryland conditions at Glen. 1982. C. Engelbrecht
- V.5512/30/1/2: Crop farming: evaluation of crop succession systems in which wheat and maize are grown under dryland conditions in the Hertzogville area. 1986. S.W.J. van der Merwe
- V.5512/30/1/3: Crop farming: the improvement of water use efficiency through the application of basin tillage practices and different production systems and practices. 1986. P.J. Snyman
- V.5512/30/3/1: Crop farming: crop succession systems in which different crops are grown under irrigation at Riet River. 1988. C. Engelbrecht
- V.5512/30/3/2: Crop farming: research on the most advantageous crop rotation system under irrigation at Vaalharts. 1990. J.H. Pienaar
- V.5512/30/3/3: Crop farming: crop succession system with various crops under irrigation at Upington. 1990. J. de V. Nel

MIXED FARMING/GEMENGDE BOERDERY

• *Management/Bestuur*

- D.5513/41/1/6: The compilation of a manual to promote mixed farming production techniques in the Dohne sour grassveld. 1987. M.L. Bode
- N.5513/41/1/1: Mixed farming: the development of a farm planning manual for use in Natal Region. 1986. L.D. Papenfus
- W.5513/41/1/1: Mixed crop and animal production practices for optimum land utilisation in the Swartland. 1973. J.D. Langenhoven
- W.5513/41/1/2: A study of soil fertility in the Swartland and Rûens area using legume crops in rotation with small grain. 1978. J.D. Langenhoven
- W.5513/41/1/3: Mixed farming: optimum sowing density and nitrogen fertilisation for oats used as pasture and hay crop in the Swartland of the winter rain cropping area. 1985. J.N. Diener

AGRICULTURAL PRODUCTION ECONOMY RESEARCH LANDBOUPRODUKSIE-EKONOMIENAVORSING

Macro resource economy/Makrohulpbronekonomie

PRODUCTION FACTOR STUDIES/PRODUKSIEFAKTORSTUDIES

• *Production economics/Produksie-ekonomie*

- PE.5611/48/1/1: Production factor studies: the determination of a remuneration for the management function in agricultural concerns. 1980. J.S.G. Joubert
- PE.5611/48/1/3: Production factor studies: an agricultural economic evaluation of alternative irrigation systems in the Orange-Vaal irrigation area. 1987. E.J. du Toit
- PE.5611/48/2/1: Production factor studies: the determination of the value of agriculture land in the RSA. 1976. B.D.T. Janse van Rensburg
- PE.5611/48/2/2: Production factor studies: the determination of rental tariffs and parameters for realistic rental tariffs for farm land. 1980. B.D.T. Janse van Rensburg
- PE.5611/48/2/3: Production factor studies: determination of the economic value of irrigation water in the upper Berg River and Eerste River Valley. 1982. J.M. van Zyl
- PE.5611/48/2/4: An investigation of the buying of agricultural land in certain farming areas of the western Cape in order to explain possible differences between the market price and investment value of land. 1988. J.P. Lombard

STRUCTURAL STUDIES/STRUKTUURSTUDIES

• *Production economics/Produksie-ekonomie*

- PE.5612/48/1/1: Structural studies: the development of an alternative methodology for the determination of minimum farm size. 1982. D. Armer
- PE.5612/48/1/3: Structural studies: a study of benefit/cost analysis of investments in the public sector viable farm unit. 1983. G.R. Backeberg
- PE.5612/48/1/4: Structural studies: market potential and price analysis of selected agricultural products for benefit/cost analysis of resource development. 1986. D. Armer
- PE.5612/48/1/5: Structural studies: quantification of relationships between input and output and expected economic returns of crop production with variable water supply. 1986. T. Virag

- PE.5612/48/1/6: Structural studies: economics of a scale of a typical farming enterprise on the Vaalharts Government Water Scheme. 1988. J.H. van Dyk
- PE.5612/48/2/10: Structural studies: economic analysis of irrigation schemes and water supply schemes. 1983. G.R. Backeberg
- PE.5612/48/3/5: Structural studies: a system approach to decision analysis in irrigation farming. 1986. G.R. Backeberg
- PE.5612/48/3/6: Structural studies: efficiency comparisons between big and small as well as company and family farming in the Sundays River Valley, Eastern Cape. 1986. D.J. Groenewald
- PE.5612/48/3/7: Structural studies: the effectiveness of interest subsidies on carry-over debt and new production credit to crop farmers in the north-western Free State. 1988. T. Swart

Farm business management/Plaasbedryfsleer

BUSINESS RESULTS/BEDRYFSRESULTATE

• Production economics/Produksie-ekonomie

- PE.5621/48/1/3: Economical investigation into game farming in South Africa. 1987. J. Behr
- PE.5621/48/1/5: Structural studies: quantification of relationships between input and output and expected economic returns of crop production with variable water supply. 1986. T. Virag
- PE.5621/48/2/2: Business results and the production cost of wheat and other branches of farming in the eastern Free State summer rain cropping areas. 1977. D.J. Mulder
- PE.5621/48/3/1: Business results and the production cost of wheat and other branches of farming in the Swartland of the winter rain cropping area. 1947. D.J. Mulder
- PE.5621/48/3/2: Business results and the production cost of wheat and other branches of farming in the Ruens of the winter rain cropping area. 1947. J.M. van Zyl
- PE.5621/48/4/1: The summary and grouping of farm business results. 1980. D.J. Mulder
- PE.5621/48/4/2: Business results: the development and updating of a micro-orientated agricultural economic databank. 1987. D.J. Mulder
- PE.5621/48/5/1: Business results: computerisation of business surveys with a view to the determination of production costs and the economics of farm enterprises. 1984. D.J. Mulder
- PE.5621/48/5/2: Business results: the development of methodologies and computer models for the construction and application of typical farming units in policy and macro-economics research. 1987. G. du Toit

MANAGEMENT TECHNIQUES/BESTUURSTEGNIEKE

• Production economics/Produksie-ekonomie

- D.5622/48/1/1: Management techniques: the development and provision of agricultural economic computer models for extension personnel in the East Coast and Albany subregions. 1987. J.F. Els
- PE.5622/48/1/1: Management techniques: the development of an elementary book keeping book for farmers. 1982. A. de K. Marais
- PE.5622/48/1/3: Management techniques: research in respect of the drawing up and computerisation of income and cost budgets (Combud). 1981. C.W. Mostert
- PE.5622/48/1/5: Management techniques: the introduction and evaluation of the financial record book for farmers. 1983. A. de K. Marais

- PE.5622/48/1/6: Management techniques: the development of a model for decision making in the replacement of orchards in the winter rain cropping areas. 1984. J.G. van Wyk
- PE.5622/48/1/7: Management techniques: the development of techniques for the accomplishment of a farm management service by means of advanced computerised planning techniques. 1986. J.M. van Zyl
- PE.5622/48/1/8: Management techniques: research in respect of the computerisation of the financial record book for farmers. 1984. A. de K. Marais
- PE.5622/48/1/9: Management techniques: the practical application of micro-computers at farm level. 1985. D.J. Mulder
- PE.5622/48/1/10: Management techniques: the effect of income tax on the decision-making process of extensive livestock farmers in the Free State Region. 1986. N.F. Botha
- PE.5622/48/1/11: Management techniques: marketing strategy for extensive beef production in the northern Transvaal. 1986. P.J. Cornelius
- PE.5622/48/1/12: Management techniques: strategies for maximisation of after-tax profit and capital growth in Lowveld avocado farming. 1987. W.P.A.H. Boel
- PE.5622/48/2/1: Management techniques: farm management studies with mail-in records as data source in the Winter Rainfall Region. 1961. J.M. van Zyl
- PE.5622/48/2/2: Management techniques: farm management studies with Agrirep as data source in the Winter Rainfall Region. 1981. J.M. van Zyl
- PE.5622/48/3/1: Management techniques: farm management studies with mail-in records as data source in the Natal Region. 1961. E.N.C. Whitehead
- PE.5622/48/3/3: Management techniques: farm management studies with mail-in records as data source in the Free State Region. 1961. A. de K. Marais
- PE.5622/48/4/1: Management techniques: farm management studies with mail-in records as data source in the Karoo Region. 1964. D.S. Vorster
- PE.5622/48/4/3: Management techniques: farm management studies with mail-in records as data source in the Eastern Cape Region. 1964. C.J. Potgieter
- PE.5622/48/5/1: Management techniques: farm management studies with mail-in records as data source in the Transvaal Region. 1964. P.J. Cornelius
- PE.5622/48/5/3: Management techniques: farm management studies with mail-in records as data source in the Highveld Region. 1964. P.F. du Plessis
- PE.5622/48/6/1: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the Winter Rainfall Region. 1973. C.H. Ferrandi
- PE.5622/48/7/1: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the Natal Region. 1973. E.N.C. Whitehead
- PE.5622/48/7/2: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the Free State Region. 1973. A. de K. Marais
- PE.5622/48/7/3: Management techniques: preparation and updating of machinery cost standards. 1980. E.N.C. Whitehead
- PE.5622/48/8/1: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the Karoo Region. 1973. S.S. Hansen
- PE.5622/48/8/2: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the Eastern Cape Region. 1973. C.J. Potgieter
- PE.5622/48/9/1: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the Transvaal Region. 1973. D.C. du Toit
- PE.5622/48/9/2: Management techniques: the use of income and cost budgets for effective planning of livestock and crop enterprises in the summer rain cropping area of the Highveld Region. 1973. P.F. du Plessis

ENTERPRISE RELATIONSHIPS/BEDRYFSVERHOUDINGS

• *Production economics/Produksie-ekonomie*

- PE.5623/48/1/5: Enterprise relationship: cost benefit analysis for the supply of irrigation water out of the Theewaterskloof Dam to the Eersteriviervallei. 1986. J.M. van Zyl
- PE.5623/48/1/6: The optimum choice of agricultural enterprises in identified regions in the Swartland. 1988. R.J. Nowers
- PE.5623/48/2/2: Enterprise relationship: the introduction of long-term pasture crops in sheep production systems in the Central grassveld of the Free State Region. 1982. A. de K. Marais
- PE.5623/48/2/5: Assessment of the profitability of irrigated pastures for livestock farming in the Highland sourveld regions of Natal. 1984. A. de K. Marais
- PE.5623/48/2/6: Some economic aspects of fertiliser usage in maize production in Natal. 1986. C.G. Berry
- PE.5623/48/2/7: Enterprise relationship: a long-term economic evaluation of sheep production systems at different stocking rates on climax grasslands in the central Free State. 1986. A. Odendaal
- PE.5623/48/2/8: Enterprise relationship: an examination of the economic and financial causes of non-optimal utilisation of natural pastures in the magisterial district of Gordonia. 1988. J.J. Kamfer
- PE.5623/48/3/1: Enterprise relationship: the economic evaluation of the utilisation of fodder crops with Merino sheep in the Fish River Valley. 1982. S.S. Hansen
- PE.5623/48/3/2: Enterprise relationship: the economic evaluation of development studies of components of dry-grass bushveld grazing in the Eastern Cape. 1976. C.J. Potgieter
- PE.5623/48/3/3: Enterprise relationship: the economic evaluation of the potential pastures in respect of small stock in the eastern coastal areas of the Eastern Cape. 1976. C.J. Potgieter
- PE.5623/48/3/4: Enterprise relationship: the development and evaluation of a profitable livestock farming system for the Valley bushveld areas in good condition in the Eastern Cape Region. 1983. C.J. Potgieter
- PE.5623/48/3/5: Enterprise relationship: the development and evaluation of a profitable livestock farming system for the Valley bushveld in deteriorated condition of the Eastern Cape Region. 1983. C.J. Potgieter
- PE.5623/48/3/6: Enterprise relationship: the development, management and evaluation of adapted livestock farming system Campagna in the high rainfall sourveld areas of the Eastern Cape. 1983. C.J. Potgieter
- PE.5623/48/4/1: Enterprise relationship: wintering of woolled sheep and other livestock in the northern Drakensberg grazing region. 1982. H.A. Minnaar
- PE.5623/48/4/3: Enterprise relationship: the influence of different feeding strategies on the economic efficiency of beef cattle in the summer rain cropping areas. 1983. J.J. de Bruyn
- PE.5623/48/4/5: An economic analysis of dairy enterprises and their financial roles in the farming structure of mixed farming in the summer rain cropping area. 1984. P.J. Cornelius
- PE.5623/48/4/7: Enterprise relationship: strategy for production continuation and renewal of citrus and subtropical orchards in the bushveld area. 1984. D.C. du Toit
- PE.5623/48/4/9: Enterprise relationship: the economic evaluation of the RHFA concept with respect to the minimising of risk and the determination of land values. 1986. J.J. de Bruyn
- PE.5623/48/4/10: Enterprise relationship: the influence of different feeding strategies on the economic efficiency of small stock farming in the summer rain cropping areas. 1986. P.F. du Plessis

SOIL CONSERVATION RESEARCH/GRONDBEWARINGSNAVORSING

Soil conservation/Grondbewaring

EROSION/EROSIE

• *Situation analysis/Situasiebepaling*

- V.5711/35/1/1: Erosion: investigation of the functional efficiency of subsidised waterways in the middle Free State subregion. 1985. S.J. van Reenen

• *Conservation studies/Bewaringstudies*

- D.5711/38/1/1: Erosion: the determination of soil losses associated with various tillage practices on various soil series established to pineapples in the East London district. 1982. B. Denyer
- D.5711/38/1/2: Erosion: the determination of soil losses associated with various tillage practices and land use on soil series at Alexandria. 1983. B. Denyer
- D.5711/38/1/3: The determination of soil losses associated with various tillage practices and land use on various soil series in Humansdorp Extension Ward. 1986. B. Denyer
- D.5711/38/1/4: Erosion: the correlation of soil loss figures obtained from natural run-off plots and rainfall simulator trials on pineapple ridges. 1985. B. Denyer
- D.5711/38/2/2: Erosion: the effect of various small structures in eroded watercourses in the High rainfall sourveld. 1985. E. Marx
- D.5711/38/2/3: Erosion: the effect of small structures in eroded watercourses in the bushveld areas. 1984. G.M. Bicknell
- D.5711/38/2/4: The influence of small conservation structures and re-established plant cover in the eroded low lying areas in the Henderson semi-palatable bushveld. 1987. P.C. Griffiths
- D.5711/38/4/1: To determine the maximum safe length and fall in ridges as well as spacing of contours on various pineapple land lay-outs associated with various tillage practices and soil series in order to combat erosion. 1985. B. Denyer
- D.5711/38/5/1: Erosion: the effect of burning and post-burn grazing practices on run-off and soil loss in the Dohne sour grassveld. 1988. M.L. Bode
- N.5711/38/1/1: Erosion studies using natural run-off plots. 1985. W.B. Russell
- N.5711/38/1/2: Studies using a rainfall simulator and natural run-off plots to quantify soil losses from veld. 1982. R.P. Simms
- N.5711/38/1/3: Erosion and run-off studies on pineapple lands in Zululand. 1987. W.B. Russell
- N.5711/38/1/4: Study of the rainfall erosivity pattern of the Natal Region. 1988. M.D. Gibbs
- V.5711/38/1/1: Erosion: investigation of adapted grass covers for waterways in RHFA 4053. 1985. P.J. Knoester
- V.5711/38/2/1: Erosion: water run-off control planning of the Immigrant area in the Petrusburg Extension Ward. 1985. F.J. Smit
- V.5711/38/2/2: Erosion: water run-off control planning of subcatchment area 3 of the Korannaberg catchment area in Excelsior district in the Brandfort Extension Ward. 1985. S.J. van Reenen
- V.5711/38/2/3: Erosion: water run-off control planning of the Rondas area in the Brandfort Extension Ward. 1986. C.S. van Niekerk

- V.5711/38/2/4: Erosion: water run-off control planning of the Spioenheuvel area in the Boshof district in the Kimberley Extension Ward. 1987. J.H. Mulder
- V.5711/38/3/1: Erosion: investigation of the functional efficiency of different types of small conservation structures in eroded areas in dongas and gullies in the Edenburg Extension Ward. 1985. S. Brink
- V.5711/38/3/2: Erosion: investigation of the functional efficiency of different types of small conservation structures in dongas and gullies in the Postmasburg Extension Ward. 1985. J. Weyers

• *Engineering/Ingenieurskunde*

- LI.5711/51/1/1: Engineering aspects of soil erosion: aspects of gully erosion. 1983. P.J. Strumpher
- LI.5711/51/1/2: Engineering aspects of soil erosion: aspects regarding soil losses. 1983. P. McPhee

DRAINAGE/DREINERING

• *Agrohydrology/Agrohidrologie*

- V.5712/34/1/1: The planning and implementation of drainage systems on waterlogged and salinised irrigation lands in the Vaalharts irrigation area. 1985. J.H. Mulder
- V.5712/34/1/2: The planning and implementation of drainage systems on waterlogged and salinised irrigation lands in the Douglas Extension Ward. 1985. J.H. Mulder

RESOURCE CONSERVATION/HULPBRONBEWARING

Planning of areas/Beplanning van gebiede

FARM PLANNING/PLAASBEPLANNING

• *Agrohydrology/Agrohidrologie*

- N.5831/34/1/1: Farm planning: run-off control planning in the Howick Extension Ward. 1979. M.G. Price
- N.5831/34/1/2: Farm planning: run-off control planning in the Greytown Extension Ward. 1979. R.C. Richardson
- N.5831/34/1/3: Farm planning: run-off control planning in the Ixopo Extension Ward. 1979. A.D. Simpson
- N.5831/34/1/4: Farm planning: run-off control planning in the Pongola Extension Ward. 1979. R.J. Dicks
- N.5831/34/1/5: Farm planning: run-off control planning in the Kokstad Extension Ward. 1979. D.B. Austin
- N.5831/34/1/6: Farm planning: run-off control planning in the Richmond Extension Ward. 1979. E.M.F. McAllister
- N.5831/34/1/7: Farm planning: run-off control planning in the Newcastle Extension Ward. 1979. M.P. Wentzel
- N.5831/34/1/8: Farm planning: run-off control planning in the Vryheid Extension Ward. 1979. R.J. Dicks
- N.5831/34/1/9: Farm planning: run-off control planning in the Estcourt Extension Ward. 1979. S.K. Armour
- N.5831/34/1/10: Farm planning: run-off control planning in the Dundee Extension Ward. 1979. P.P. Kloppers

- N.5831/34/1/11: Farm planning: run-off control planning in the Pietermaritzburg Extension Ward. 1979. P.J.D. Nicholson
- N.5831/34/1/12: Farm planning: run-off control planning in the Ladysmith Extension Ward. 1979. K.W. Watkinson
- T.5831/34/1/2: Farm planning: run-off control of the north-eastern Springbok Flats area. 1980. J. Bellingham
- T.5831/34/1/3: Farm planning: run-off control in the south-eastern area of the Transvaal Region. 1976. M.M. Struthers
- T.5831/34/1/4: Farm planning: run-off control in the middle Transvaal area of the Transvaal Region. 1979. K.P. de Beer
- T.5831/34/1/5: Farm planning: run-off control in the Annysspruit area of the south-eastern Transvaal area. 1975. J.C. Nel
- T.5831/34/1/6: Farm planning: run-off control in the Klein-Komati area of the south-eastern Transvaal. 1975. J.C. Mouton
- T.5831/34/1/11: Farm planning: the design of a water run-off control system for the Strydom block area - Lowveld, Komatiepoort. 1975. M.V. Watrus
- T.5831/34/1/12: Farm planning: run-off control in the Sabie Valley area - the design of a water run-off control system in the Sabie Valley and White River. 1975. M.V. Watrus
- T.5831/34/1/13: Farm planning: run-off control in the western Transvaal area (Syferbult) of the Transvaal Region. 1985. J.T. Nel
- T.5831/34/2/1: Farm planning: run-off control in the Badplaaskom area of the south-eastern area of the Transvaal Region. 1975. H.P. den Dulk
- T.5831/34/2/2: Farm planning: run-off control in the western Transvaal (Bokfontein) area of the Transvaal Region. 1986. C.J. Meiring
- T.5831/34/2/3: Run-off control in the western Transvaal area (Koedoeshoop West) of the Transvaal Region. 1986. G.P. Engelbrecht

• *Conservation studies/Bewaringstudies*

- T.5831/38/1/1: The physical and hydrographical planning of farms in the Warmbaths ward. 1989. M.F. Joubert
- T.5831/38/1/2: The physical and hydrographical planning of farms in the Nylstroom ward. 1989. B.F. Greeff
- T.5831/38/1/4: The physical and hydrographical planning of farms in the Pietersburg ward. 1989. D.W. Nell
- T.5831/38/1/6: Farm planning: the survey, design, specification and inspection of erosion facilities in the Warmbaths ward. 1989. M.F. Joubert
- T.5831/38/1/7: Farm planning: the survey, design, specification and inspection of erosion facilities in the Nylstroom ward. 1989. B.F. Greeff
- T.5831/38/1/9: Farm planning: the survey, design, specification and inspection of erosion facilities in the Pietersburg ward. 1989. D.W. Nell
- T.5831/38/2/1: The physical and hydrographical planning of farms in the Thabazimbi ward. 1990. C.J.H. Möller
- T.5831/38/2/2: Farm planning: the physical and hydrographical planning of farms in the Ellisras Extension Ward. 1989. J.J. Pretorius
- T.5831/38/2/3: The physical and hydrographical planning of farms in the Messina ward. 1989. J.P. Janse van Rensburg
- T.5831/38/2/4: Farm planning: the survey, design, specification and inspection of erosion facilities in the Thabazimbi ward. 1990. C.J.H. Möller
- T.5831/38/2/5: Farm planning: the survey, design, specification and inspection of erosion facilities in the Ellisras Extension Ward. 1989. J.J. Pretorius

- T.5831/38/2/6: Farm planning: the survey, design, specification and inspection of erosion facilities in the Messina ward. 1989. J.P. Janse van Rensburg
- T.5831/38/2/7: Farm planning: the survey, specification, installation and inspection of a test drainage pipe at Weipe in the Messina Extension Ward. 1989. J.P. Janse van Rensburg
- T.5831/38/3/1: Farm planning: the physical planning of farms and the specification of soil conservation structures in the Nelspruit North ward. 1989. P.J. Venter
- T.5831/38/3/2: Farm planning: the survey, specification and inspection of erosion structures in the Nelspruit North ward. 1989. P.J. Venter
- T.5831/38/3/3: Farm planning: the physical planning of farms and the specification of soil conservation structures in the Nelspruit South ward. 1989. P.J.L. Bierman
- T.5831/38/3/4: Farm planning: the survey, specification and inspection of soil conservation structures in the Nelspruit South ward. 1990. P.J.L. Bierman
- T.5831/38/3/5: Farm planning: the physical planning of farms and the specification of soil conservation structures in the Tzaneen ward. 1989. J.H. van Eyk
- T.5831/38/3/6: Farm planning: the survey, specification and inspection of erosion structures in the Tzaneen ward. 1989. J.H. van Eyk
- T.5831/38/3/7: Farm planning: the physical planning of farms and the specification of soil conservation in the Lydenburg ward. 1989. L.C.R. Hartzer
- T.5831/38/3/8: Farm planning: the survey, specification and inspection of erosion structures in the Lydenburg ward. 1989. L.C.R. Hartzer
- T.5831/38/4/1: Farm planning: the physical and hydrographical planning of farms in the Belfast ward. 1989. G.P. Engelbrecht
- T.5831/38/4/2: Farm planning: the physical and hydrographical planning of farms in the Carolina ward. 1989. H.S. du Toit
- T.5831/38/4/3: Farm planning: the physical and hydrographical planning of farms in the Ermelo ward. 1989. P.J. Gerber
- T.5831/38/4/4: Farm planning: the physical and hydrographical planning of farms in the Piet Retief ward. 1989. J.C. Nel
- T.5831/38/4/5: Farm planning: the physical and hydrographical planning of farms in the Volksrust ward. 1989. O.G. Wartington
- T.5831/38/4/6: Farm planning: the survey, design, specification and inspection of conservation works in the Belfast ward. 1989. G.P. Engelbrecht
- T.5831/38/4/7: Farm planning: the survey, design and inspection of conservation works in the Carolina ward. 1989. M.S. du Toit
- T.5831/38/4/8: Farm planning: the survey, design, specification and inspection of conservation works in the Ermelo ward. 1989. P.J. Gerber
- T.5831/38/4/9: Farm planning: the survey, design, specification and inspection of conservation works in the Piet Retief ward. 1989. J.C. Nel
- T.5831/38/4/10: Farm planning: the survey, design, specification and inspection of conservation works in the Volksrust ward. 1989. O.G. Wartington
- T.5831/38/5/1: Farm planning: the physical and hydrographical planning of farms in the Groblersdal ward. 1990. L.M. van Rooyen
- T.5831/38/5/2: Farm planning: the survey, design, specification and inspection of conservation works in the Groblersdal ward. 1990. L.M. van Rooyen
- T.5831/38/5/3: Farm planning: the physical and hydrographical planning of farms in the Bronkhorstspuit ward. 1989. G.P.J. Erasmus
- T.5831/38/5/4: Farm planning: the survey, design, specification and inspection of conservation works in the Bronkhorstspuit ward. 1989. G.P.J. Erasmus
- T.5831/38/5/5: Farm planning: the physical and hydrographical planning of farms in the Silverton ward. 1990. M.M. Struthers

- T.5831/38/5/6: Farm planning, the survey, design, specification and inspection of conservation works in the Silverton ward. 1990. M.M. Struthers
- T.5831/38/5/7: Farm planning: the physical and hydrographical planning of farms in the Middelburg ward. 1989. K.P. de Beer
- T.5831/38/5/8: Farm planning: the survey, design, specification and inspection of conservation works in the Middelburg ward. 1989. K.P. de Beer
- T.5831/38/5/9: Farm planning: the revision of documentation for the execution of the financial aid scheme in the Middle Transvaal subregion 1990. A.C.T. Hitchcock
- T.5831/38/6/1: Farm planning: the physical and hydrographical planning of farms in the Rustenburg ward. 1989. J.T. Nel
- T.5831/38/6/2: Farm planning: the survey, design, specification and inspection of conservation works in the Rustenburg ward. 1989. J.T. Nel
- T.5831/38/6/3: Farm planning, the physical and hydrographical planning of farms in the Brits ward. 1989. J.J. Jacobs
- T.5831/38/6/4: Farm planning: the survey, design, specification and inspection of conservation works in the Brits ward. 1989. J.J. Jacobs
- T.5831/38/6/5: Farm planning: the physical and hydrographical planning of farms in the Zeerust ward. 1989. C.J. Meiring
- T.5831/38/6/6: Farm planning: the survey, design, specification and inspection of conservation works in the Zeerust ward. 1989. C.J. Meiring

• *Management/ Bestuur*

- D.5831/41/1/1: Planning of farms within the Alexandria magisterial district to promote the efficient conservation of natural resources. 1984. A.E.O. Botha
- D.5831/41/1/2: Planning of farms with regard to veld utilisation and resource conservation within the Elliot Extension Ward to promote the efficient utilisation and conservation of natural resources. 1985. E. Marx
- D.5831/41/1/3: Farm planning within the Barkly East Extension Ward to promote efficient utilisation and conservation of natural resources. 1985. J.S.J. Jordaan
- D.5831/41/1/4: Farm planning of farms within the Adelaide Extension Ward to promote efficient utilisation and conservation of natural resources. 1985. G.M. Bicknell
- D.5831/41/1/5: Planning of farms within the Bathurst magisterial district to promote the efficient utilisation and conservation of natural resources. 1985. B.I. Hill
- D.5831/41/1/6: Planning of farms within the Tarkastad magisterial district to promote the efficient utilisation and conservation of agricultural resources. 1983. W.J.M. Els
- D.5831/41/1/7: Planning of farms in the Komga magisterial district to promote the efficient utilisation and conservation of the natural resources. 1984. C.J. Bradfield
- D.5831/41/1/8: Planning of farms in the Stutterheim Extension Ward to promote the efficient utilisation and conservation of the natural resources. 1984. P.C. Griffiths
- D.5831/41/1/9: Planning of farms within the Sterkstroom magisterial district to promote the efficient utilisation and conservation of the natural resources. 1983. J.H. Fourie
- D.5831/41/1/10: Planning of farms within the Albany magisterial district to promote efficient utilisation and conservation of natural resources. 1986. W.J. Penny
- D.5831/41/1/11: Planning of farms with regard to veld utilisation and resource conservation within the Humansdorp Extension Ward to promote the efficient utilisation and conservation of natural resources. 1985. J.P. van Zyl
- D.5831/41/1/12: Planning of farms within the Molteno magisterial district (Dordrecht Extension Ward) to promote efficient utilisation and conservation of the natural resources. 1985. J.C. van der Walt
- D.5831/41/1/13: Planning of farms within the Uitenhage and Kirkwood magisterial districts to promote the efficient utilisation and conservation of the natural resources. 1985. C.S. van R. Müller

- D.5831/41/1/14: Planning of farms within the Queenstown magisterial district to promote the efficient utilisation and conservation of the natural resources. 1983. W.J.M. Els
- D.5831/41/1/15: Planning of farms in the Port Elizabeth magisterial district of the eastern seaboard area. 1986. R.P. Laing
- D.5831/41/1/16: Planning of farms within the Aliwal North Extension Ward to promote efficient utilisation and conservation of the natural resources. 1985. D.T. Bezuidenhout
- D.5831/41/2/1: Run-off control planning of farms in the sub-catchment area No. 10900104 in the Humansdorp Extension Ward. 1984. J.P. van Zyl
- D.5831/41/2/2: Run-off control planning of farms in the Zuney Valley, sub-catchment area No. 14200200. 1984. A.E.O. Botha
- D.5831/41/2/3: Farm planning: area run-off control planning in catchment areas No. 041308, 041309 and 041312 within the Barkly East Extension Ward. 1985. J.S.J. Jordaan
- D.5831/41/2/4: Farm planning: area run-off control planning in sub-catchment No. 17500400 in the Elliot Extension Ward. 1985. E. Marx
- D.5831/41/2/5: Run-off control planning of farms in the Baviaans River catchment area - drainage region No. 1560 - Bedford magisterial district. 1985. G.M. Bicknell
- D.5831/41/2/6: Area run-off control planning of farms in the Elands River Valley sub-catchments No 12100100 and 11700300. 1985. C.S. van R. Müller
- D.5831/41/2/7: Farm planning: stabilising of eroded watercourses in upper Heuningklip River - sub-catchment area 1730/02/04. 1983. J.E. Aspinall
- D.5831/41/2/8: Farm planning: run-off control planning in a portion of the sub-catchment area No. 04130500 (Bossielaagte) situated in the Lady Grey magisterial district. 1985. D.T. Bezuidenhout
- D.5831/41/2/9: Water run-off control planning of farms in the area demarcated as Upper-Coerney, sub-catchment No. 13401501 in the Paterson area. 1985. R.P. Laing
- D.5831/41/2/11: Area run-off control planning of farms in the Buyskloof Valley, sub-catchment No. 14200100, in the eastern seaboard area. 1986. A.E.O. Botha
- D.5831/41/2/12: Farm planning: maintenance and improvement of existing run-off control plans on cultivated lands in the catchment areas No. 041308, 041309 and 041312 within the Barkly East Extension Ward. 1985. J.S.J. Jordaan
- D.5831/41/2/13: Farm planning: run-off control planning in the sub-catchment area 15430101 (Vrolikskraal) situated in the Molteno magisterial district. 1985. J.C. van der Walt
- D.5831/41/2/14: Farm planning: water run-off control - improvement and maintenance of existing contour systems in the Elands River catchment area. 1986. I. du P. Barlow
- D.5831/41/2/15: Farm planning: stabilising of eroded watercourses in Bamboeshoek, sub-catchment area No. 17300201. 1984. J.H. Fourie
- D.5831/41/2/16: Area run-off control planning of farms in the sourveld area in the Humansdorp Extension Ward of the Karoo and arid areas. 1986. E.C. Kieck
- D.5831/41/2/17: Area run-off control planning of farms in the Upper Krom River area in the Humansdorp Extension Ward of the eastern seaboard area. 1986. E.C. Kieck
- D.5831/41/2/18: Farm planning: area run-off control planning of irrigation lands in the Hankey magisterial district. 1986. R.P. Laing
- D.5831/41/2/19: Water run-off control planning of all pineapple farms in the East London Extension Ward. 1985. I.D. Scholtz
- D.5831/41/2/20: Farm planning: area run-off control planning of irrigation in the proposed Kabeljou irrigation area in the Humansdorp magisterial district. 1987. E.C. Kieck
- D.5831/41/2/21: Farm planning: area run-off control planning of lands in the Blue River Valley. 1988. C.J. Bradfield
- D.5831/41/2/22: Farm planning: water run-off control - determining the most suitable grass(es) to be used in waterways and watercourses in the Algoa subregion. 1988. I. du P. Barlow

ENTREPRENEUR DEVELOPMENT ONDERNEMERSONTWIKKELING

EXTENSION SCIENCE INVESTIGATIONS VOORLIGTINGKUNDIGE ONDERSOEKE

Resources and technology/Hulpbronne en tegnologie

MANAGEMENT FACTORS/BESTUURSFAKTORE

- *Persuasion/Oorreding*

- T.6114/39/1/2: To create an awareness among farmers of the breeding and feeding problems by means of performance test competitions in the Volksrust Extension Ward. 1989. H.P.J. Scholtz
- T.6114/39/1/3: Creating an awareness of specific fodder-flow problems (in winter and summer) by means of case studies at individual farmers of the Volksrust Extension Ward. 1989. H.P.J. Scholtz
- T.6114/39/1/4: The use of performance testing by individual farmers in the Volksrust Extension Ward as an aid to solve their problems. 1989. H.P.J. Scholtz
- T.6114/39/1/5: Management factors: creating an awareness for farms adapted to veld conditions and the use of performance testing. 1989. H.P.J. Scholtz
- T.6114/39/1/6: Fodder flow planning for individual farmers in the Volksrust Extension Ward. 1989. H.P.J. Scholtz

MAN/MENS

- *Situation analysis/Situasiebepaling*

- H.6115/35/1/1: Factors that influence the under-achievement of first-year students at Potchefstroom College of Agriculture. 1983. L.I. de Waal

- *Extension science/Voorligtingkunde*

- N.6115/40/1/1: Human potential in relation to optimum land use of farmers in the Underberg Extension Ward. 1974. D.M. Rix

RUN-OFF CONTROL/AFLOOPBEHEER

- *Agrohydrology/Agrohidrologie*

- T.6118/34/1/6: Run-off control in the Klein Komati area of the south-eastern Transvaal. 1975. J.C. Mouton
- T.6118/34/1/10: Run-off control: the design of a water run-off control system in the Bokpoort target area in Potgietersrus. 1975. J. Bellingham
- T.6118/34/1/11: Run-off control: the design of a water run-off control system for the Strydom block area - Lowveld, Komatipoort. 1975. M.V. Wattrus
- T.6118/34/1/12: Run-off control in the Sabie Valley area - the design of a water run-off control system in the Sabie Valley, Witrivier. 1975. M.V. Wattrus
- T.6118/34/2/1: Run-off control in the Badplaaskom area of the south-eastern Transvaal area of the Transvaal Region. 1975. J.C. Mouton

COMMUNICATION/KOMMUNIKASIE

• *Extension science/Voorligtingkunde*

- N.6119/40/1/1: The use of agricultural literature in communicating information to farmers in the Natal Region. 1982. Marion A. Abbott
- W.6119/40/1/1: Communication: an extension science investigation into the effectiveness of the table grape block competition in the Hex River Valley. 1985. G.G. van der Merwe

PROGRAMMED EXTENSION/GEPROGRAMMEERDE VOORLIGTING

Resource utilisation/Hulpbronbenutting

STOCK AND GAME FARMING/VEE- EN WILDBOERDERY

• *Situation analysis/Situasiebepaling*

- D.6211/35/2/1: Stock and game farming: potential studies in the "Duneveld" farming area of the Riversdale Extension Ward. 1988. J.W. du Preez
- W.6211/35/1/1: Stock and game farming: situation study of dairy farming in the Swartland, Boland, Klein-Karoo and South Coast subregions. 1988. J.A.J. Baard

• *Evaluation/Evaluasie*

- D.6211/37/1/1: Stock and game farming: to demonstrate the utilisation and control of tree and shrub species in the humid grass/bush communities of the Bathurst Extension Ward. 1987. P.G. King
- D.6211/37/1/2: Stock and game farming: to assess vegetation change in the Alexandria ward due to the aerial application of a herbicide to *Acacia karroo*. 1986. A.E. du Plessis

• *Persuasion/Oorreding*

- D.6211/39/1/1: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Queenstown Extension Ward. 1984. L.P.J. Swart
- D.6211/39/1/2: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Bedford magisterial district. 1986. J.B. Marais
- D.6211/39/1/3: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Albany magisterial district. 1986. J.L. Clacey
- D.6211/39/1/5: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Alexandria Extension Ward. 1986. A.E. du Plessis
- D.6211/39/1/6: Stock and game farming: training of collaborators and extension officers in the Eastern Cape Region to achieve optimum milk production. 1986. P.J. Olivier
- D.6211/39/1/7: Stock and game farming: promotion of adopted stock farming in the Valley Bushveld of the Uitenhage Extension Ward. 1984. L.O. Grobler
- D.6211/39/1/8: Stock and game farming: persuasion of farmers in the Port Elizabeth Extension Ward to achieve optimum pasture and animal production. 1987. J.B.C. Kilfoil
- D.6211/39/1/9: Stock and game farming: training of farmer collaborators and extension staff in the Eastern Cape Region to promote optimum small stock production. 1987. J.C. Scheltema
- D.6211/39/1/10: Stock and game farming: the persuasion of farmers in the Thomas River conservation district to control and eradicate silver and black wattle. 1986. A.M. Grenfell

- D.6211/39/1/11: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Stutterheim Extension Ward. 1986. A.M. Grenfell
- D.6211/39/1/12: Stock and game farming: the determination of veld grazing utilisation practices and farmer's knowledge and perceptions regarding these veld management practices in the King William's Town and Komga districts. 1985. W.E. Ristow
- D.6211/39/1/13: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the King William's Town and Komga districts. 1986. W.E. Ristow
- D.6211/39/1/14: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Humansdorp Extension Ward - high potential agricultural area. 1987. F.J. Weitz
- D.6211/39/1/15: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Humansdorp Extension Ward - sourveld. 1987. F.J. Weitz
- D.6211/39/1/16: Stock and game farming: the persuasion of farmers to achieve optimum grazing utilisation and animal production in the Dordrecht Extension Ward. 1986. D.W. Schoeman
- D.6211/39/1/17: Stock and game farming: the persuasion of farmers to promote optimal veld utilisation and animal production in the Elliot Extension Ward. 1987. G.R. Morgan
- D.6211/39/1/18: Stock and game farming: the persuasion of farmers to promote optimal maize production in the Elliot Extension Ward. 1987. G.R. Morgan
- D.6211/39/1/19: Stock and game farming: the persuasion of farmers to achieve optimal pasture utilisation and animal production in the Elliot Extension Ward. 1987. G.R. Morgan
- D.6211/39/1/20: Stock and game farming: the persuasion of farmers to achieve optimum pasture utilisation and animal production in the Aliwal North Extension Ward. 1986. O.V. Loest
- D.6211/39/1/21: Stock and game farming: the persuasion of farmers to promote optimal pasture utilisation and animal production in the Elands River area at the Uitenhage Extension Ward. 1988. L.O. Grobler
- D.6211/39/2/1: Stock and game farming: promotion of adapted stock farming in the Valley bushveld of the Uitenhage Extension Ward. 1984. L.O. Grobler
- K.6211/39/1/1: Stock and game farming: persuasion of farmers to apply the group camp approach of veld management in the Extension Ward of Graaff-Reinet. 1985. J.G. Theron
- K.6211/39/1/2: Stock and game farming: persuasion of farmers to apply the group camp approach of veld management in the Cradock Extension Ward. 1985. P.S. van Heerden
- K.6211/39/1/3: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Burgersdorp Extension Ward. 1985. J.H. Spoelstra
- K.6211/39/1/4: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Colesberg Extension Ward. 1985. M. van Niekerk
- K.6211/39/1/5: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the De Aar Extension Ward. 1985. N. Wilson
- K.6211/39/1/6: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Middelburg Extension Ward. 1985. J.D. Blom
- K.6211/39/1/7: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Calvinia Extension Ward. 1985. N. Nortje
- K.6211/39/1/8: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Carnarvon Extension Ward. 1985. G.Z.J. Barnard
- K.6211/39/1/9: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Kenhardt Extension Ward. 1985. J.J. Zandberg
- K.6211/39/1/10: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management in the Prieska Extension Ward. 1985. D.J. Roux

- K.6211/39/1/11: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management, Beaufort West Extension Ward. 1986. A.J. Wiid
- K.6211/39/1/12: Stock and game farming: persuasion of farmers to practise the group camp approach of veld management, Fraserburg Extension Ward. 1986. I.J. van der Merwe
- K.6211/39/2/1: Stock and game farming: persuasion of farmers to introduce drought fodder crops in the farming systems in the Graaff-Reinet Extension Ward. 1984. J.G. Theron
- K.6211/39/2/2: Stock and game farming: persuasion of farmers to establish drought fodder crops in the Colesberg Extension Ward. 1985. M. van Niekerk
- K.6211/39/2/3: Stock and game farming: persuasion of farmers to establish drought fodder crops in the De Aar Extension Ward. 1985. W.H. van Staden
- K.6211/39/2/4: Stock and game farming: persuasion of farmers to establish drought fodder crops in the Middelburg Extension Ward. 1985. J.D. Blom
- K.6211/39/2/5: Stock and game farming: persuasion of farmers to introduce drought fodder crops in the farming systems in the Calvinia Extension Ward. 1985. N. Nortje
- K.6211/39/2/6: Stock and game farming: persuasion of farmers to introduce drought fodder crops in the farming systems in the Carnarvon Extension Ward. 1985. G.Z.J. Barnard
- K.6211/39/2/7: Stock and game farming: persuasion of farmers to introduce drought fodder crops in the farming systems in the Kenhardt Extension Ward. 1985. J.J. Zandberg
- K.6211/39/2/8: Stock and game farming: persuasion of farmers to introduce drought fodder crops in the farming systems in the Prieska Extension Ward. 1985. D.J. Roux
- K.6211/39/2/9: Stock and game farming: persuasion of farmers to plant drought fodder crops, Beaufort West Extension Ward. 1986. A.J. Wiid
- K.6211/39/3/1: Stock and game farming: promotion of the combating of proclaimed weeds in the veld in the Somerset East Extension Ward. 1985. J.C. van Aardt
- K.6211/39/3/2: Stock and game farming: promotion of the combating of proclaimed weeds in the Graaff-Reinet Extension Ward. 1980. J.G. Theron
- K.6211/39/3/4: Stock and game farming: persuasion of putative trespassers of the Agricultural Resources Act in the Jansenville Extension Ward. 1987. E.M. Bosch
- K.6211/39/3/5: Stock and game farming: persuasion of putative trespassers of the Agricultural Resources Act in the Somerset East Extension Ward. 1987. J.C. van Aardt
- K.6211/39/4/1: Stock and game farming: persuasion of putative trespassers of the Agricultural Resources Act in the Cradock Extension Ward. 1985. P.S. van Heerden
- K.6211/39/4/2: Stock and game farming: persuasion of putative trespassers of the Agricultural Resources Act in the Graaff-Reinet Extension Ward. 1985. J.G. Theron
- K.6211/39/4/3: Stock and game farming: persuasion of putative trespassers of the Agricultural Resources Act in the Middelburg (C.P.) Extension Ward. 1985. J.D. Blom
- N.6211/39/1/3: Stock and game farming: the promotion of cultivated pastures in the Ixopo Extension Ward. 1985. M.J. Pereira da Conceico
- N.6211/39/2/1: Stock and game farming: the promotion of improved veld management practices in the Weenen conservation district. 1974. S.K. Armour
- N.6211/39/2/2: Stock and game farming: the promotion of improved veld management practices in the Muden area of the Umvoti magisterial district. 1979. K.G. Camp
- N.6211/39/5/1: Stock and game farming: the promotion of grazing and animal management practices in the Underberg conservation area. 1986. C.M. Allan
- V.6211/39/1/1: Stock and game farming: the persuasion of stock farmers in the Molopo Extension Ward to contain bush encroachment. 1985. M.J. van den Heever
- V.6211/39/1/2: Stock and game farming: the persuasion of stock farmers in the Molopo Extension Ward to adopt improved grazing and stock farming practices. 1985. M.J. van den Heever
- V.6211/39/1/3: Stock and game farming: the persuasion of stock farmers in the Molopo Extension Ward to keep farming records and to adopt financial management practices. 1985. M.J. van den Heever

- V.6211/39/1/4: Stock and game farming: the persuasion of demonstrator farmers to determine the grazing potential of grazing capacity zones in the Molopo Extension Ward. 1985. M.J. van den Heever
- V.6211/39/2/1: Stock and game farming: the persuasion of stock farmers in the Postmasburg Extension Ward to contain bush encroachment. 1985. L.J. de Jager
- V.6211/39/2/2: Stock and game farming: the determination of veld and stock management practices in the Postmasburg Extension Ward. 1985. L.J. de Jager
- V.6211/39/2/3: Stock and game farming: the persuasion of stock farmers in the Postmasburg Extension Ward to keep farming records and to adopt financial management practices. 1985. L.J. de Jager
- V.6211/39/2/4: Stock and game farming: the persuasion of demonstrator farmers to determine the grazing potential of grazing capacity zones in the Postmasburg Extension Ward. 1985. L.J. de Jager
- V.6211/39/4/1: Stock and game farming: the persuasion of stock farmers in the Brandfort Extension Ward to change their attitude towards veld management. 1985. H. Putter
- V.6211/39/4/2: Stock and game farming: the persuasion of stock farmers in the Brandfort Extension Ward to adopt radical veld improvement practices. 1985. H. Putter
- V.6211/39/4/3: Stock and game farming: the persuasion of stock farmers in the Brandfort Extension Ward to have their farms planned. 1985. H. Putter
- V.6211/39/4/4: Stock and game farming: the persuasion of stock farmers in the Brandfort Extension Ward to adopt sound veld management practices. 1985. H. Putter
- V.6211/39/4/5: Stock and game farming: the persuasion of stock farmers in the Brandfort Extension Ward to develop a fodder flow programme annually and to implement it. 1985. H. Putter
- V.6211/39/4/6: Stock and game farming: the persuasion of stock farmers in the Brandfort Extension Ward to keep farming records and to adopt financial management practices. 1985. H. Putter
- V.6211/39/5/1: Stock and game farming: the persuasion of stock farmers in the Theunissen Extension Ward to change their attitude towards veld management. 1985. H. Putter
- V.6211/39/5/2: Stock and game farming: the persuasion of stock farmers in the Theunissen Extension Ward to adopt radical veld improvement practices. 1985. H. Putter
- V.6211/39/5/3: Stock and game farming: the persuasion of stock farmers in the Theunissen Extension Ward to have their farms planned. 1985. H. Putter
- V.6211/39/5/4: Stock and game farming: the persuasion of stock farmers in the Theunissen Extension Ward to adopt sound veld management practices. 1985. H. Putter
- V.6211/39/5/5: Stock and game farming: the persuasion of stock farmers in the Theunissen Extension Ward to develop a fodder flow programme annually and to implement it. 1985. H. Putter
- V.6211/39/5/6: Stock and game farming: the persuasion of stock farmers in the Theunissen Extension Ward to keep farming records and to adopt financial management practices. 1985. H. Putter
- V.6211/39/6/1: Stock and game farming: the persuasion of sheep farmers in the Edenburg Extension Ward to adopt improved grazing and stock farming practices. 1985. J.H. Venter
- V.6211/39/6/2: Stock and game farming: the determination of the grazing potential in the grazing capacity zones of the Edenburg Extension Ward. 1985. J.H. Venter
- V.6211/39/6/3: Stock and game farming: the persuasion of stock farmers in the Edenburg Extension Ward to establish perennial cultivated pastures. 1985. J.H. Venter
- V.6211/39/6/4: Stock and game farming: the persuasion of stock farmers in the Edenburg Extension Ward to keep farming records and to adopt financial management practices. 1985. J.H. Venter
- V.6211/39/7/1: Stock and game farming: the persuasion of farmers in the "Duineveld" of Upington North Extension Ward to adapt their stock numbers according to available grazing. 1985. G.N. Esterhuizen

- V.6211/39/7/2: Stock and game farming: to make the farmers aware of the reproduction losses and mortality of mutton sheep. 1985. G.N. Esterhuizen
- V.6211/39/7/3: Stock and game farming: to demonstrate the influence of energy supplementary feeding on the performance of mutton sheep ewes in the Upington North Extension Ward. 1985. G.N. Esterhuizen
- V.6211/39/7/4: Stock and game farming: to identify "top farmers" in the Upington North Extension Ward and stipulate privileges and recognition for them. 1985. G.N. Esterhuizen
- V.6211/39/7/5: Stock and game farming: the persuasion of farmers in the Upington North Extension Ward towards better stock practices by means of the demonstration farm, Massakloutjie. 1985. G.N. Esterhuizen
- V.6211/39/10/1: Stock and game farming: the persuasion of sheep farmers in the Smithfield Extension Ward to adopt recommended grazing management principles. 1988. O.G. Olivier
- V.6211/39/10/2: Stock and game farming: the persuasion of sheep farmers in the Smithfield Extension Ward to adopt stock management principles. 1988. O.G. Olivier
- V.6211/39/10/3: Stock and game farming: the persuasion of sheep farmers in the Smithfield Extension Ward to adopt financial management principles. 1988. O.G. Olivier
- W.6211/39/1/1: Stock and game farming: persuasion of farmers in the Oudtshoorn Extension Ward to establish and utilise drought resistant forage crops. 1985. C.J. Nel
- W.6211/39/1/2: Stock and game farming: persuasion of small stock farmers in the Montagu Extension Ward to cultivate and utilise drought resistant forage and dryland pastures. 1985. E.J.J. Nel
- W.6211/39/1/3: Stock and game farming: persuasion of stock farmers in the Ladismith Extension Ward to establish and utilise drought resistant forage crops and dryland pasture as well as the establishment of Karoobush seed plots for veld reinforcement. 1985. C.F. Scholtz
- W.6211/39/2/1: Stock and game farming: persuasion of small stock farmers in the Vredendal Extension Ward to apply improved grazing management practices based on knowledge of natural grazing plants and their physiological needs. 1985. G. Louw
- W.6211/39/2/2: Stock and game farming: persuasion of farmers in the Vredendal Extension Ward to establish drought forage crops. 1985. G. Louw
- W.6211/39/3/1: Stock and game farming: persuasion of irrigation farmers in the Swellendam Extension Ward to implement optimal use of established pastures in their dairy fodder flow programmes. 1985. J.P. Pietersen
- W.6211/39/3/2: Stock and game farming: persuasion of farmers in the Riversdal Extension Ward to improve the profitability of their dairy herds through the evaluation and interpretation of physical/financial record-keeping results. 1985. J.W. du Preez
- W.6211/39/3/4: Stock and game farming: persuasion of sheep farmers in the Bredasdorp Extension Ward to implement management systems that would result in achieving a higher weaning percentage. 1985. D. Cronje
- W.6211/39/3/5: Stock and game farming: the persuasion of stock farmers in the Swellendam Extension Ward to apply chemical control of annual invader grasses in their dryland legume pastures. 1985. J.P. Pietersen
- W.6211/39/3/6: Stock and game farming: persuasion of sheep farmers in the Swellendam Extension Ward to implement management systems that would increase their income from sheep. 1990. J.D.G. Kasselmann
- W.6211/39/4/1: Stock and game farming: persuasion of sheep farmers in the Malmesbury Extension Ward to implement management practices that would lead to higher weaning percentages. 1985. J.H.F. Roelofse
- W.6211/39/5/1: Stock and game farming: persuasion of dairy farmers in the Durbanville Extension Ward to apply improved management techniques. 1985. G.J. Joubert
- W.6211/39/6/1: Stock and game farming: persuasion of farmers in the Olifantsrivier-Gamka farming area to improve their management and utilisation of lucerne. 1985. B.F.A. Visser
- W.6211/39/8/1: Stock and game farming: persuasion of stock farmers in the Ladismith Extension Ward to implement improved flock management techniques towards better reproduction and weaning percentage. 1989. C.F. Scholtz

- *Management/ Bestuur*

N.6211/41/1/2: Stock and game farming: the analysis of stock and game management systems on veld in the Pongola Extension Ward. 1986. D.M. Gammon

- *Modelling/ Modellerling*

N.6211/42/1/3: Stock and game farming: development of a beef breeding herd simulator programme. 1975. B.P. Louw

CROP FARMING/SAAIBOERDERY

- *Chemical control/ Chemiese beheer*

N.6212/21/1/1: Crop farming: insect pests of maize and their control. 1986. R.A. Bell

- *Situation analysis/ Situasiebepaling*

W.6212/35/1/1: Crop farming: situation analysis of the occurrence of earblight (*Fusarium graminearum* group 2) on wheat in the South Coast subregion of the Langkloof. 1989. W.G.J. Voigt

- *Persuasion/ Oorreding*

K.6212/39/2/1: Crop farming: persuasion of farmers to practise optimal irrigation management and techniques in the Cradock Extension Ward. 1984. P.S. van Heerden

K.6212/39/2/2: Crop farming: persuasion of farmers to practise optimal irrigation management and techniques in the Somerset East Extension Ward. 1984. P.S. van Heerden

N.6212/39/1/1: The promotion of improved crop farming practices in the Winterton conservation area. 1976. S.D. le Roux

V.6212/39/1/1: Crop farming: the persuasion of irrigation farmers in the Rietrivier Irrigation Scheme to apply irrigation scheduling with the aid of the PUTU irrigation model. 1988. P.M. le Roux

W.6212/39/1/3: Crop farming: persuasion of farmers in the George Extension Ward to incorporate lupins as a crop in their farming systems. 1985. W.G.J. Voigt

W.6212/39/2/1: Crop farming: persuasion of farmers in the Piketberg Extension Ward to apply improved small grain production techniques. 1985. B.F. Saaiman

W.6212/39/2/2: Crop farming: persuasion of farmers in the Moorreesburg area of jurisdiction to raise the profitability of farming by the use of physical financial management information. 1985. W. Burger

W.6212/39/2/3: Crop farming: persuasion of farmers in the Moorreesburg Extension Ward to apply improved weed control techniques. 1986. I.F. Slabbert

MIXED FARMING/GEMENGDE BOERDERY

- *Situation analysis/ Situasiebepaling*

W.6213/35/1/1: Mixed farming: situation analysis in order to establish a databank for the Agricultural Development Centre, George. 1989. J.H. Blomerus

- *Persuasion/ Oorreding*

D.6213/39/1/1: Mixed farming: to persuade crop farmers in the Alexandria Extension Ward to adopt optimal crop production systems. 1986. A.E. du Plessis

- D.6213/39/1/2: Mixed farming: to persuade farmers in the Alexandria ward to implement the water run-off control plans drawn up for their farms. 1987. A.E. du Plessis
- D.6213/39/1/3: Mixed farming: the training of extension personnel in the east coast and central subregions with regard to economic principles and concepts and their practical application. 1987. J.F. Els
- D.6213/39/1/4: Mixed farming: to persuade landowners to effectively protect their lands which are situated above the Gamtoos State Water Scheme and for which run-off control programmes were served. 1987. H.J. Smith
- D.6213/39/1/5: Mixed farming: optimal resource development of the irrigation area in the Hankey magisterial district. 1987. H.J. Els
- H.6213/39/1/1: Persuasion of farmers with mixed farming enterprises in the Bethlehem Extension Ward in order to promote optimal land utilisation. 1981. J.H. de Klerk
- H.6213/39/1/2: Persuasion of farmers with mixed farming enterprises in the Harrismith Extension Ward in order to promote optimal land utilisation. 1983. J.T. van Rooyen
- H.6213/39/1/3: Persuasion of farmers with mixed farming enterprises in the Kroonstad Extension Ward in order to promote optimal land utilisation. 1981. P.J. van Wyk
- H.6213/39/1/4: Persuasion of farmers with mixed farming enterprises in the Bothaville Extension Ward in order to promote optimal land utilisation. 1979. J.I. de V. Burger
- H.6213/39/1/5: Persuasion of farmers with mixed farming enterprises in the Parys Extension Ward in order to promote optimal land utilisation. 1981. A.G.H. Kotze
- H.6213/39/1/6: Persuasion of farmers with mixed farming enterprises in the Klerksdorp Extension Ward in order to promote optimal land utilisation. 1981. C.F. van Eeden
- H.6213/39/1/7: Persuasion of farmers with mixed farming enterprises in the Lichtenburg subregion in order to promote optimal land utilisation. 1982. M.M. Grobbelaar
- H.6213/39/1/8: Persuasion of farmers with mixed farming enterprises in the Heidelberg subregion in order to promote optimal land utilisation. 1978. C.C.A. Breed
- H.6213/39/1/9: Persuasion of farmers with mixed farming enterprises in the Wolmaransstad Extension Ward in order to promote optimal land utilisation. 1986. A.J. Loretz
- H.6213/39/1/10: Persuasion of farmers with mixed farming enterprises in the Potchefstroom Extension Ward in order to promote optimal land utilisation. 1986. J.J. Steyn
- H.6213/39/1/11: Persuasion of farmers with mixed farming enterprises in the Vrede Extension Ward in order to promote optimal land utilisation. 1987. M.J. Marais
- H.6213/39/1/12: Persuasion of farmers with mixed farming enterprises in the Standerton Extension Ward in order to promote optimal land utilisation. 1987. J.A. Rafferty
- H.6213/39/1/13: Persuasion of farmers with mixed farming enterprises in the Frankfort Extension Ward in order to promote optimal land utilisation. 1987. P.J. Smith
- H.6213/39/1/14: Persuasion of farmers with mixed farming enterprises in the Schweizer Reneke Extension Ward in order to promote optimal land utilisation. 1987. A.M. Potgieter
- N.6213/39/1/1: The promotion of optimum production based on resource planning in the Pietermaritzburg Extension Ward. 1986. G. McGrath
- T.6213/39/1/1: Mixed farming: the persuasion of farmers to practise optimal resource utilisation in the High rainfall sourveld area of Belfast. 1985. A. van Deventer
- T.6213/39/2/1: Mixed farming: situation analysis of the irrigation practices in the Groblersdal Extension Ward. 1986. M.G. du Toit
- T.6213/39/2/2: Mixed farming: optimum utilisation and conservation of natural veld. 1990. J.M.D. Venter
- T.6213/39/2/3: Mixed farming: efficient bush control for veld improvement. 1990. J.M.D. Venter
- T.6213/39/2/4: Mixed farming: attaining more efficient fodder utilisation on farming units by means of complete fodder flow programmes. 1990. J.H.D. Venter
- T.6213/39/3/1: Mixed farming: situation analysis of the peach industry in the Silverton Extension Ward. 1986. J.B. Stevens

- T.6213/39/3/2: Mixed farming: determination of a benchmark of the peach industry by means of case studies in the Silverton Extension Ward. 1986. J.B. Stevens
- T.6213/39/3/3: Mixed farming: training of peach farmers in the implementation of adopted practices. 1987. J.B. Stevens
- T.6213/39/3/4: Training of and advice to officers and farmers in financial planning of farms. 1990. W.D. Haines
- T.6213/39/5/1: Fodderflow planning for individual farmers. 1990. L. de Beer
- T.6213/39/5/3: The establishment of an organisational structure for Agricultural Development. 1990. L. de Beer
- T.6213/39/6/1: Creating an awareness among farmers of specific fodderflow problems (in winter and summer) by means of case studies at individual farmers. 1990. D.L. van Niekerk
- T.6213/39/8/1: The gathering and computerisation of relevant information on adapted fodder crops under dryland conditions and irrigated land. 1990. D.J.J. Burger
- V.6213/39/1/1: Mixed farming: the persuasion of stock farmers in the Mafeking Extension Ward to contain bush encroachment. 1985. W. Goldblatt
- V.6213/39/1/2: Mixed farming: the persuasion of stock farmers in the Mafeking Extension Ward to adopt improved grazing and stock farming practices. 1985. W. Goldblatt
- V.6213/39/1/3: Mixed farming: the persuasion of stock farmers in the Mafeking Extension Ward to keep farming records and to adopt financial management practices. 1985. W. Goldblatt
- V.6213/39/1/4: Mixed farming: the persuasion of demonstrator farmers to determine the grazing potential of grazing capacity zones in the Mafeking Extension Ward. 1985. W. Goldblatt
- V.6213/39/1/5: Mixed farming: the persuasion of demonstrator farmers to develop economic methods for the eradication of sandgeelhout invader plants. 1985. W. Goldblatt

● *Norm studies/Normstudies*

- D.6213/50/1/1: Mixed farming: collection and processing of pasture and animal production data for use in dairy production. 1986. P.J. Olivier
- D.6213/50/1/2: Mixed farming: collection and processing of pasture and animal production data for use in small stock production. 1986. J.C. Scheltema

FRUIT FARMING/VRUGTEBOERDERY

● *Potential studies/Potensiaalstudies*

- W.6214/36/5/1: Fruit farming: potential studies of pome fruit and almonds in the Vredendal Extension Ward at the Experimental Farm of VORI near Lutzville. 1990. P.B. van der Merwe

● *Persuasion/Oorreding*

- T.6214/39/1/1: Fruit farming: the persuasion of guava farmers to optimal resource utilisation in the irrigation areas of the Lowveld. 1982. J.J. Kruger
- T.6214/39/1/2: The persuasion of banana producers to optimal resource utilisation in the irrigation areas of the Transvaal Lowveld. 1983. C.C. Engelbrecht
- T.6214/39/1/3: Fruit farming: norms determining demonstration plots for the Komatipoort Banana Study Group. 1988. R.L. Morse
- T.6214/39/1/4: Fruit farming: norms determining demonstration trials with tissue culture planting material and new cultivars for the Komatipoort Banana Study Group. 1990. R.L. Morse
- T.6214/39/1/5: Fruit farming: situation analysis of the banana industry in the Komatipoort farming area. 1990. R.L. Morse

- Γ.6214/39/1/6: Fruit farming: situation analysis of the mango industry in the Nelspruit North and Nelspruit South Extension Wards. 1990. J.J. Kruger
- Γ.6214/39/1/7: Fruit farming: situation analysis of the pecan nut industry in the Nelspruit North and the Nelspruit South Extension Wards. 1990. J.J. Kruger
- Γ.6214/39/1/8: Fruit farming: situation analysis of the macadamia nut industry in the Nelspruit North and the Nelspruit South Extension Wards. 1990. J.J. Kruger
- W.6214/39/1/1: Fruit farming: persuasion of farmers in the Langkloof farming area to implement recommended soil-plant combinations, correct soil preparation and established techniques. 1985. W.S. van der Merwe
- W.6214/39/2/2: Fruit farming: persuasion of farmers in the Ceres Extension Ward to implement updated techniques in irrigation. 1988. P.W. Immelman
- W.6214 39 3 1: Fruit farming: persuasion of farmers in the Franschoek-Simonsberg area to implement scientific practices for the planning of resource utilisation. 1988. J. Strydom
- W.6214/39/4/1: Fruit farming: persuasion of farmers in the Langkloof farming area to increase fruit set and yield of Packham's Triumph pears. 1988. W.S. van der Merwe
- W.6214/39/4/2: Fruit farming: persuasion of farmers in the Langkloof farming area to implement optimal irrigation techniques. 1990. W.S. van der Merwe

VEGETABLE FARMING/GROENTEBOERDERY

• *Persuasion/Oorreding*

- W.6215/39/1/1: Vegetable farming: persuasion of onion farmers in the Caledon Extension Ward to implement improved farming techniques. 1985. C.L. van Rooyen

VITICULTURE/WINGERDBOERDERY

• *Persuasion/Oorreding*

- V.6216/39/1/1: Viticulture: the persuasion of grape farmers in the Uprising Extension Ward to apply pre-harvest bunch treatment. 1988. D.J. Malan
- W.6216/39/1/1: Viticulture: persuasion of farmers in the Vredendal Extension Ward to apply correct techniques of winter pruning and manipulation of summer foilage. 1985. S. Lutz
- W.6216/39/1/2: Viticulture: persuasion of farmers in the Vredendal Extension Ward to apply updated techniques of irrigation. 1986. P.B. van der Merwe
- W.6216/39/2/1: Viticulture: persuasion of farmers in the Amalienstein/Van Zylsdamme farming area to implement optimal irrigation techniques. 1985. M.J. de W. Delpont
- W.6216/39/3/1: Viticulture: persuasion of farmers in the Mamalienstein/Van Zylsdamme farming area to implement recommended soil-plant combinations, correct soil preparation and establishment techniques for perennial crops. 1985. M.J. de W. Delpont
- W.6216/39/3/2: Viticulture: persuasion of farmers in the irrigation areas of Montagu Extension Ward to implement recommended soil-crop combinations, correct soil preparation and establishment techniques for perennial crops. 1985. W.J. Basson
- W.6216/39/4/1: Viticulture: persuasion of farmers in the Wellington Extension Ward to implement scientifically founded establishment practices for perennial crops. 1985. W.J.K. Ferreira

• *Management/Bestuur*

- W.6216/41/1/1: Viticulture: expert guidance of interested farmers towards the application of improved irrigation management techniques in the Worcester Extension Ward. 1988. C.P.J. de Jager.
- W.6216/41/1/2: Viticulture: the promotion of strategic and tactical management skills amongst grape and fruit farmers in the Wellington Extension Ward. 1988. P.B. Zietsman

IRRIGATION FARMING/BESPROEIINGSBOERDERY

• *Persuasion/Oorreding*

- T.6217/39/1/1: Irrigation farming: the determination and mapping of the quality of borehole water in the Ohrigstad area. 1990. J.J.I. Swanepoel
- T.6217/39/1/2: Irrigation farming: a survey to determine the management ability of all the farmers in the Ohrigstad area. 1990. J.J.I. Swanepoel
- T.6217/39/1/3: Irrigation farming: the determination of the veld condition (grazing capacity) and mapping in the Ohrigstad area. 1990. J.J. de Jager
- T.6217/39/1/4: Irrigation farming: a survey of the extent and intensity of bush encroachment in the Ohrigstad area. 1990. J.J. de Jager
- T.6217/39/1/5: To demonstrate the effect of different paprika planting methods and the manipulation of plants for optimum yields. 1990. J.J.I. Swanepoel
- T.6217/39/1/6: Determination of optimal plant density for paprika. 1969. J.J.I. Swanepoel
- T.6217/39/1/7: Economic importance and control of nematodes in paprika. 1990. P.F. du Toit
- T.6217/39/1/9: Destructiveness and control of insect pests in paprika. 1990. P.F. du Toit
- T.6217/39/1/10: Weed control in paprika. 1990. P.F. du Toit.

AGRICULTURAL INFORMATION SERVICES LANDBOU-INLIGTINGSDIENSTE

Information services/Inligtingsdienste

• *Management/Bestuur*

- N.6610/41/1/1: The development of a computerised database and associated programmes to provide agricultural production information for the Natal Region. 1989. D.J. Milborrow

AGRICULTURAL ENGINEERING SERVICES LANDBOU-INGENIEURSDIENSTE

Agricultural mechanisation/Landboumeganisasie

POWER SOURCES AND LABOUR/KRAGBRONNE EN ARBEID

• *Engineering/Ingenieurskunde*

- LI.6711/51/1/1: Evaluation of tractor characteristics - power take-off shaft and safety frames. 1982. J.J.P.C. Swanepoel
- LI.6711/51/1/2: Power sources and labour: performance of two-wheel, four-wheel and crawler track-driven tractors under a variety of conditions. 1981. R.W. Otterman

AGRICULTURAL IMPLEMENTS/LANDBOUWERKTUIG

• *Engineering/Ingenieurskunde*

- LI.6712/51/1/1: Engineering aspects of agricultural machinery. 1982. A.J. Heyns

Agricultural structures and facilities/Landboustrukture en -fasiliteite

CLIMATE-CONTROLLED STRUCTURES/KLIMAATBEHEERDE STRUKTURE

- *Engineering/Ingenieurskunde*

L1.6722/51/1/1: Engineering aspects of climatic-controlled structures. 1982. P.J. Britz

STOCK HOUSING AND FACILITIES/VEEBEHUISING EN -FASILITEITE

- *Engineering/Ingenieurskunde*

L1.6723/51/1/1: Engineering aspects of animal housing and facilities. 1982. P.A. Henning

L1.6723/51/1/2: Engineering aspects of animal housing and related facilities in the Winter Rainfall Region. 1982. J.C. Venter

Irrigation and drainage engineering/Besproeiings- en dreineringsingenieurswese

IRRIGATION/BESPROEIING

- *Engineering/Ingenieurskunde*

L1.6731/51/1/1: Engineering aspects of irrigation. 1982. F.B. Reinders

DRAINAGE/DREINERING

- *Engineering/Ingenieurskunde*

L1.6732/51/1/1: Engineering aspects of sub-surface drainage systems. 1982. F.J.C. Hugo

BOTANY/BOTANIE

BOTANY RESEARCH/BOTANIESE NAVORSING

Plant taxa/Planttaksons

FLORA

• *Taxonomy/Taksonomie*

- PL.7111/01/1/6: Flora of southern Africa: Liliaceae - Dracaenoideae and Asparagoideae. 1979. G.E. Gibbs Russell
- PL.7111/01/1/7: Flora of southern Africa: Ericaceae - minor genera. 1970. E.G.H. Oliver
- PL.7111/01/1/14: Flora of southern Africa: Bryophyta. 1976. J. van Rooy
- PL.7111/01/1/17: Flora of southern Africa: keys to southern African grasses. 1981. G.E. Gibbs Russell
- PL.7111/01/1/18: Flora of southern Africa: Poaceae subfamilies Oryzoideae, Centostecoideae and Bambusoideae. 1981. G.E. Gibbs Russell
- PL.7111/01/1/19: Flora of southern Africa: Restionaceae. 1981. G.E. Gibbs Russell
- PL.7111/01/1/20: Flora of southern Africa: the tribe Desmodiae (Fabaceae - Papillonoideae). 1981. B.D. Schrire
- PL.7111/01/1/21: Flora of southern Africa: Orchidaceae. 1981. G.E. Gibbs Russell
- PL.7111/01/1/23: Flora of southern Africa: Salicaceae, Fabaceae, Urticaceae and Piperaceae. 1984. K.L. Immelman
- PL.7111/01/1/24: Flora of southern Africa: the tribe Tephrosieae (Fabaceae - Papillonoideae). 1985. B.D. Schrire
- PL.7111/01/1/26: Flora of southern Africa: Liliaceae - Aloineae - *Aloe*. 1985. H.F. Glen
- PL.7111/01/1/27: Flora of southern Africa: the tribe Indigofereae (Fabaceae-Papillionoideae). 1987. B.D. Schrire
- PL.7111/01/1/28: Flora of southern Africa: Lythraceae, Lecythidaceae and Rhizophoraceae. 1987. K.L. Immelman
- PL.7111/01/1/29: Flora of southern Africa: Portulacaceae. 1988. H.F. Glen
- PL.7111/01/1/30: Flora of southern Africa: Convolvulaceae. 1988. W.G. Welman
- PL.7111/01/2/1: Illustrated flora of the Pretoria region. 1973. O.A. Leistner
- PL.7111/01/2/2: Regional flora: Transvaal wild flowers (Vol. 2). 1984. G. Germishuizen
- PL.7111/01/2/3: Flora of Namaqualand. 1987. G.E. Gibbs Russell
- PL.7111/01/2/4: Flora of Transvaal. 1988. E. Retief
- PL.7111/01/3/1: Pretoria National Herbarium Computerised Information System (PRECIS) for the flora of southern Africa: Specimen Database. 1986. G.E. Gibbs Russell
- PL.7111/01/3/2: Pretoria National Herbarium Computerised Information System (PRECIS) for the flora of southern Africa: Taxon Database. 1986. G.E. Gibbs Russell
- PL.7111/01/3/3: Pretoria National Herbarium Computerised Information System (PRECIS) for the flora of southern Africa: Nomenclatural Database. 1986. G.E. Gibbs Russell

ANGIOSPERMAE

• *Taxonomy/Taksonomie*

- PL.7112/01/1/1: Taxonomy of Angiospermae: the family Polygonaceae. 1979. T.H. Arnold

- PL.7112/01/1/3: Taxonomy of Angiospermae: the genus *Ficinia* (section Bracteosae). 1976. G. Germishuizen
- PL.7112/01/1/5: Taxonomy of Angiospermae: the genus *Justicia* in southern Africa. 1982. K.L. Immelman
- PL.7112/01/1/6: Taxonomy of Angiospermae: the role of fruit seed and seedling characters in the classification of Cucurbitaceae in southern Africa. 1983. E. Retief
- PL.7112/01/1/7: Taxonomy of Angiospermae: the genus *Vigna* Savi in southern Africa. 1984. B.J. Pienaar
- PL.7112/01/1/8: Taxonomy of Angiospermae: the genus *Carex* L. in southern Africa. 1985. C. Reid
- PL.7112/01/1/9: Taxonomy of Angiospermae: the broad-leaved species of the genus *Asclepias* L. in southern Africa. 1986. A. Nicholas
- PL.7112/01/1/10: Taxonomy of Angiospermae: the genus *Lachnaea* L. (Thymelaeaceae in southern Africa. 1988. J.B.P. Beyers
- PL.7112/01/1/11: Taxonomy of Angiospermae: revision of the genus *Disparago* Gaertn. in the tribe Inuleae (Asteraceae). 1988. M. Koekemoer
- PL.7112/01/2/1: Biosystematics of Angiospermae: the *Eragrostis curvula* complex. 1972. B. de Winter
- PL.7112/01/2/2: A phenological, ontogenetical and cytogenetical study of the *Digitaria eriantha* complex of the Angiospermae. 1987. J.J. Spies
- PL.7112/01/3/1: Angiospermae: flowering plants of Africa. 1921. D.J.B. Killick

• *Anatomy/Anatomie*

- PL.7112/02/1/1: Comparative anatomy of the angiosperm subfamily Arundinoideae. 1972. R.P. Ellis
- PL.7112/02/1/2: Comparative anatomy of the angiosperm subfamily Bambusoideae. 1972. R.P. Ellis
- PL.7112/02/1/3: Comparative anatomy of the angiosperm subfamily Festucoideae. 1972. R.P. Ellis
- PL.7112/02/1/4: Comparative anatomy of the angiosperm subfamily Panicoideae. 1972. R.P. Ellis
- PL.7112/02/1/5: Comparative anatomy of the angiosperm subfamily Eragrostoideae. 1972. R.P. Ellis
- PL.7112/02/1/8: Development of a leaf-tensilmeter for measuring fibre-related leaf tensile strength and application thereof for determining palatability of grasses (Angiospermae). 1986. R.H. Westfall
- PL.7112/02/2/1: Morphological and anatomical survey of the wood and bark of southern African woody Angiospermae. 1984. P.P.J. Herman
- PL.7112/02/2/2: The application of wood anatomical information of the southern African woody Angiospermae to dendrochronology, wood technology, tree physiology and forensic science. 1984. P.P.J. Herman

• *Genetics/Genetika*

- PL.7112/06/1/1: Cytotaxonomic studies of Angiospermae: the genus *Sorghum*. 1983. J.J. Spies
- PL.7112/06/1/3: Cytotaxonomic studies of Angiospermae: the genus *Heteropogon* in South Africa. 1988. H. du Plessis
- PL.7112/06/1/4: Cytotaxonomic studies of Angiospermae: the genus *Alloteropsis* in South Africa. 1988. E.J.L. Saayman
- PL.7112/06/2/1: Karyotype studies of the angiosperm family Poaceae: the subfamily Arundinoideae. 1983. J.J. Spies
- PL.7112/06/2/2: Karyotype studies of the angiosperm family Poaceae: the subfamily Bambusoideae. 1983. J.J. Spies
- PL.7112/06/2/3: Karyotype studies of the angiosperm family Poaceae: the subfamily Festucoideae. 1983. J.J. Spies
- PL.7112/06/2/4: Karyotype studies of the angiosperm family Poaceae: the subfamily Panicoideae. 1983. J.J. Spies

PL.7112/06/2/5: Karyotype studies of the angiosperm family Poaceae: the subfamily Chloridoideae. 1983. J.J. Spies

- *Plant geography/Plantgeografie*

PL.7112/25/1/3: Final distribution atlas of the woody Angiospermae of the Transvaal. 1979. J.M. Anderson

BRYOPHYTA

- *Taxonomy/Taksonomie*

PL.7115/01/1/1: Bryophyta: the ultrastructure of the wall ornamentation as a taxonomic aid in identifying the species of the genus *Riccia* (Hepaticae) in southern Africa. 1981. S.M. Perold

PL.7115/01/1/2: Taxonomy of Bryophyta: the family Ricciaceae Dum. (Hepaticae) in southern Africa. 1987. S.M. Perold

LICHENS/LIGENE

- *Taxonomy/Taksonomie*

PL.7116/01/1/1: Miscellaneous taxonomic studies on southern African lichens. 1987. F.A. Brusse

FOSSIL PLANTS/FOSSIELPLANTE

- *Taxonomy/Taksonomie*

PL.7118/01/1/1: The fossil plants of the Upper Triassic Molteno Formation in South Africa. 1978. J.M. Anderson

Vegetation/Plantegroei

FOREST/WOUD

- *Ecology/Ekologie*

PL.7121/27/1/1: Vegetation study of the Zululand coastal dunes, including forest, between Richards Bay and Mlalazi Lagoon. 1980. P.J. Weisser

PL.7121/27/1/2: Coast forest biome: conservation priorities in the dune area between Kosi Bay and Sodwana based on a vegetation survey. 1985. P.J. Weisser

PL.7121/27/2/1: A regional plant-ecological study of forests, woodlands and grasslands of the north-eastern mountain sourveld (and adjacent lowveld sour bushveld) in the Sabie area of the Eastern Transvaal escarpment. 1982. G.B. Deall

BUSHVELD/BOSVELD

- *Ecology/Ekologie*

PL.7122/27/2/1: The plant ecology of the bushveld farm Groothoek, Thabazimbi district. 1980. R.H. Westfall

PL.7122/27/2/2: The vegetation ecology of sour bushveld in the Transvaal Waterberg. 1984. R.H. Westfall

PL.7122/27/2/3: The vegetation ecology of the Upper Limpopo River Valley in the Transvaal bushveld with special reference to the implications of bush encroachment on grass cover. 1988. J.M. van Staden

FYNBOS

• Ecology/Ekologie

- PL.7123/27/1/1: Vegetation transects through the Western Cape lowland fynbos. 1977. J.C. Scheepers
- PL.7123/27/1/2: A semi-detailed regional ecological study of the Western Cape lowland fynbos. 1970. J.C. Scheepers
- PL.7123/27/1/3: A plant-ecological study of the fynbos and other vegetation in the southern Cape coastal foreland. 1985. J.C. Scheepers
- PL.7123/27/2/3: The fynbos communities of Swartboschkloof, Jonkershoek. 1982. D.J. MacDonald
- PL.7123/27/2/4: A plant-ecological study of the fynbos and other vegetation in mountain catchments of the Langeberg, South-western Cape. 1984. D.J. MacDonald
- PL.7123/27/2/5: An ecological study of mountain fynbos in the Cedarberg. 1984. H.C. Taylor
- PL.7123/27/3/1: An ecophysiological study of fynbos seedling development under competitive stress with invasive alien acacias. 1982. M.C. Rutherford
- PL.7123/27/3/2: Relative productive capacities of species populations following fire in indigenous alien mixed plant communities in the fynbos biome. 1984. C.F. Musil
- PL.7123/27/3/3: Survival of fynbos plants in areas severely invaded by alien plant species. 1984. M.C. Rutherford
- PL.7123/27/3/4: Stress-ecology processes in fynbos indigenous seedling recruitment in Strandveld subjected to invasive *Acacia* plants. 1988. C.F. Musil

GRASSLAND/GRASVELD

• Ecology/Ekologie

- PL.7124/27/1/1: A plant-ecological study of the grassland and other vegetation in the Amersfoort area of Eastern Transvaal highveld. 1984. B.J. Turner
- PL.7124/27/1/2: A plant-ecological study of the grassland and other vegetation in the Grootvlei area of the Highveld Region. 1984. J.C. Scheepers

KAROO

• Ecology/Ekologie

- PL.7125/27/1/1: Water-use efficiencies of the main plant life forms in the western Karoo. 1984. G.F. Midgley
- PL.7125/27/2/1: A reconnaissance study of the Karoo and other vegetation in the Graaff-Reinet and Middelburg areas of the eastern Karoo Region. 1987. A.R. Palmer

AQUATIC VEGETATION/AKWATIESE PLANTEGROEI

• Ecology/Ekologie

- PL.7126/27/1/2: Study of the aquatic vegetation of the Cape estuaries from the Kei River to the Orange River. 1981. M.G. O'Gallaghan

NATURALISED VEGETATION/NATUURLIKE PLANTEGROEI

• Genetics/Genetika

- PL.7127/06/1/1: Naturalised vegetation: a cytotaxonomic study of *Lantana camara* in southern Africa. 1979. J.J. Spies

PL.7127/06/1/2: Naturalised vegetation: cytotaxonomy of *Rubus* in South Africa. 1975. J.J. Spies

- *Ecology/Ekologie*

PL.7127/27/1/2: Naturalised vegetation: review of knowledge of nassella tussock grass. 1972. M.J. Wells

- *Evaluation/Evaluasie*

PL.7127/37/1/1: Naturalised vegetation: compilation and maintenance of a national weed list. 1979. M.J. Wells

AFRICAN VEGETATION/AFRIKAANSE PLANTEGROEI

- *Ecology/Ekologie*

PL.7128/27/1/2: African vegetation: a plant-ecological bibliography for southern Africa from 1976 to 1980. 1976. A.P. Backer

PL.7128/27/2/1: African vegetation: a revision of the karroid and adjoining veld types. 1945. J.C. Scheepers

PL.7128/27/3/1: African vegetation: monitoring of vegetation change in South Africa in protected areas. 1960. J.C. Scheepers

PL.7128/27/3/2: African vegetation: the experimental determination of the dependence of long-term stability of vegetation cover on the floristic diversity of key plant communities. 1988. M.C. Rutherford

PL.7128/27/4/1: The computerisation of African vegetation and habitat data for the national resource inventory using PRECIS, National Herbarium, Pretoria, for taxon updates. 1985. B.J. Vermeulen

PL.7128/27/4/2: A photo-database for visual analyses of spatial and temporal change in African vegetation types. 1985. A.P. Backer

PL.7128/27/4/3: African vegetation: synthesis of data on karroid plant population responses to autecological events using informal and formal sources. 1988. L.W. Powrie

Valuable veld plants/Waardevolle veldplante

FOOD PLANTS/VOEDSELPLANTE

- *Taxonomy/Taksonomie*

PL.7131/01/1/1: A preliminary investigation of the taxonomy and economic importance of food plants of African origin. 1979. T.H. Arnold

- *Potential studies/Potensiaalstudies*

PL.7131/36/1/1: The evaluation of selected Cucurbitaceae and Leguminosae taxa as potential food plants for future economic exploitation. 1979. S.E. Chadwick

ORNAMENTAL PLANTS/SIERPLANTE

- *Ecology/Ekologie*

PL.7134/27/1/1: The effect of substrate disturbance on fynbos systems as a result of marginal cultivation of fynbos ornamental plants. 1984. G.W. Davis

- PL.7134/27/1/2: Computer simulation of the activities of wild flower pickers in relation to available resources and market demands to predict pressure on natural populations of fynbos ornamental plant species. 1975. G.W. Davis

COVER AND BARRIER PLANTS/DEK- EN VERSPERRINGSPLANTE

- *Potential studies/Potensiaalstudies*

- PL.7135/36/1/1: Survey of potential cover and barrier plants. 1979. L. Henderson

OTHER USEFUL PLANTS/ANDER NUTTIGE PLANTE

- *Ethnobotany/Etnobotanie*

- PL.7136/26/1/1: Other useful plants: tribal plant uses in South Africa. 1977. M.J. Wells
- PL.7136/26/2/1: Other useful plants: Iron and Stone Age ethnobotany of Border Cave, Lebombo Mountain. 1976. J.M. Anderson

Research collections/Navorsingsversamelings

NATIONAL HERBARIUM/NASIONALE HERBARIUM

- *Taxonomy/Taksonomie*

- PL.7141/01/1/1: Development of a special vehicle, apparatus and labour-saving devices and methods for plant collecting for the National Herbarium, Pretoria. 1984. M.D. Panagos
- PL.7141/01/1/4: Determination of priority collecting areas and the creation of a general collecting programme for the National Herbarium, Pretoria. 1984. T.H. Arnold

**SUPPORTING AND ASSOCIATED SERVICES ONDERSTEUNENDE
EN VERWANTE DIENSTE**

**BIOMETRIC AND DATAMETRIC SERVICES BIOMETRIESE EN
DATAMETRIESE DIENSTE**

Biometric services/Biometriese dienste

ANALYTIC TECHNIQUES/ONTLEDINGSTEGNIEKE

● *Biometry/Biometrie*

BM.11212/43/1/1: Biometric analysis techniques as applied to data derived from soil analyses in Transvaal and Natal. 1983. B.E. Eisenberg



